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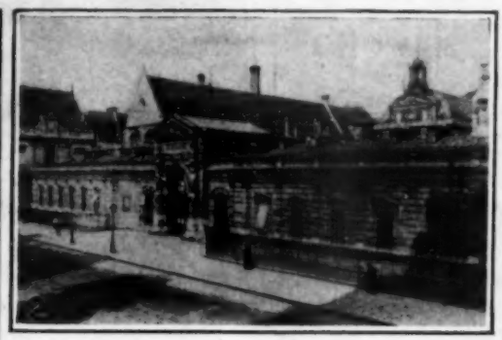


Fig. 1—Library of the Conservatoire

Fig. 2—Front entrance on Rue St.-Martin

Fig. 3—Entrance to the Museum

The Industrial Museum

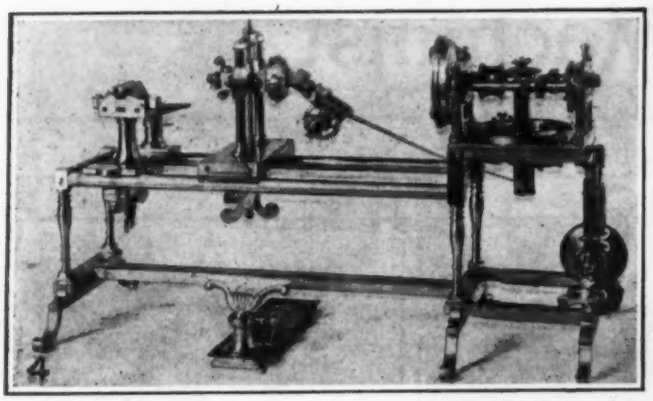
By Paul M. Atkins

History of a unique collection of industrial appliances—How it is used for instructional purposes—Details of some of the interesting exhibits

THE Industrial Museum which forms a part of the Conservatoire National des Arts et Metiers at Paris, France, is probably the only institution of its kind in the world. It is different from the few other existing industrial museums not because it is much larger, nor because of its age—it was founded in 1794—nor because of the fact that it contains objects of immense historical interest and importance; but also because of its many modern exhibits and the fact that its object is fundamentally educational for it forms an integral part of one of the great technical schools of France. This idea was expressed in the law passed during the French Revolution, a paragraph from which reads as follows: "There shall be founded at Paris under the name of CONSERVATOIRE NATIONAL DES ARTS ET METIERS a collection of machines, models, tools, drawings, descriptions and books of all kinds of arts and crafts. The construction and use of tools and machines useful in the arts and crafts shall be explained. The Conservatoire des Arts et Metiers shall be made up of three demonstrators and one designer."

The original plan thus outlined in this law is being carried out today, modified to meet modern problems. The "three demonstrators and one designer" have now increased to 23 professors with the necessary laboratory assistants and the students this past year numbered about 4,000. The library is one of the most important technical collections in Paris, and the museum possesses some 15,000 exhibits. To these must be added important laboratories not only for instruction purposes, but for the commercial testing of materials and products as well.

It appears that this idea was advanced by Descartes many years before, but nothing was done during his lifetime towards its realization. It was necessary to await the period of the French Revolution which created so much that was new in addition to tearing down so much that was old. The buildings in which the Conservatoire was housed, some of which remain to the present day, have an historical interest for they belonged to the Priory of Saint Martin des Champs which for a long time formed a part of the Cluny Order of monks. Parts of the chapel—now used to house



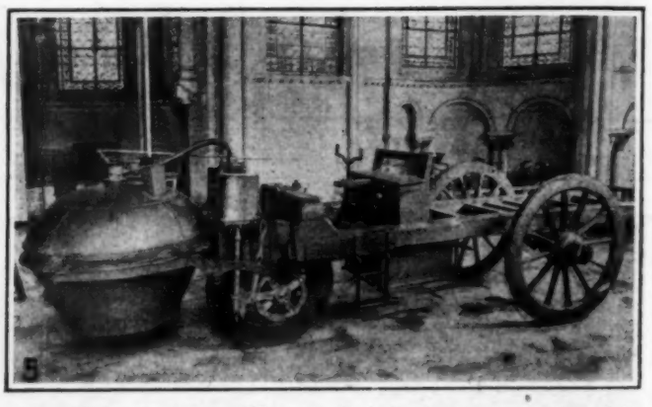


Fig. 4—Model of a lathe constructed in the shops of Vaucanson before 1783. Fig. 5—Original steam automobile built by Cugnot in 1770

large pieces that cannot be placed elsewhere—were constructed in the 11th century and the refectory which is now used as the reading room of the library, Fig. 1, was erected not long after. Most of the buildings, Figs. 2 and 3, are much more recent, though some of them are a century old or more.

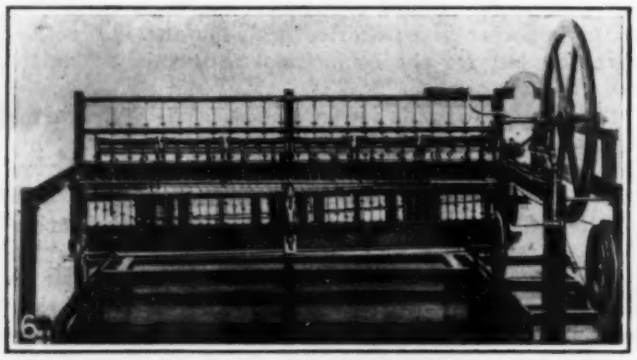
From the very beginning the museum has had utilitarian purposes for, says Gregoire' in a report concerning its foundation, "one should be able to find there all machines which do work well, which do work quickly, and which are perfect, or as nearly perfect as possible, machines based not on theories but on repeated experiments which assure their utility," and today one finds along with the exhibits of historical interest, the most modern machine tools, automobile engines, and models of steel mills, locomotives and hydro-electric plants and other industrial equipment.

The museum was started by bringing together the collection of instruments, apparatus and machines that had been accumulated by the Academie des Sciences during a century or more preceding the French Revolution and a collection of machines, tools and instruments made by a prosperous manufacturer and inventor, Vaucanson, for the purpose of providing a means for the instruction of workmen. He was an inventor of note and did much to develop machine tool building in France. To these collections was added that of the Hotel d'Aiguillon, made up of objects belonging to the kings of France. Since that time, the museum has gradually increased the number of its exhibits by purchase, gifts and loans. Certain manufacturers are now loaning examples of their latest machines and products and replacing these loans with others as they perfect their products. The limit of the physical capacity of the museum has now been reached and hence it is necessary to weed out the less important items to make room for the latest models.

The exhibits of the museum are not limited to machines, as we commonly use the word, but include a wide variety of objects. The first catalog was published in 1818 and filled one slender volume, the last catalog—which was published before the war and hence does not show the latest accessions—fills seven good sized books.

The collections are interesting from many points of view. First of all they are a mine of information for the person studying the development of industry, especially since the industrial revolution. Here are found models of original machines or the machines themselves such as the lathe developed by Vaucanson, Fig. 4, and others of a much more rudimentary form. There is also the original steam automobile, Fig. 5, designed and constructed by Cugnot about 1770 and also several of the early automobile engines of the internal combustion type which were built a century or more after that of Cugnot, but which look hardly less ancient in the light of our modern engines. It must be remembered in this connection that France was a pioneer in the development of the automobile, a point often forgotten in the United States in view of the preponderant position of the American automobile industry. There is also an extremely interesting collection of bicycles showing the gradual perfecting of that very convenient little means of transportation which by the way is used far more in Europe than it is now in the United States.

The Conservatoire National des Arts et Metiers is one of the comparatively few schools giving a course in spinning and weaving. In this work it is greatly aided by the fine collection of models of spinning and weaving machines which the museum possesses, Fig. 6,



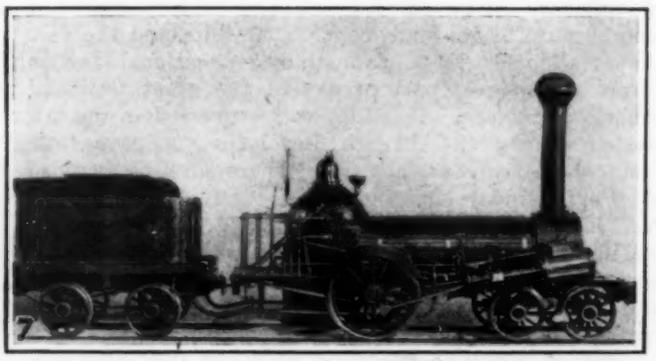


Fig. 6—Model of a spinning mule obtained in 1812. Fig. 7—Model of an American locomotive and tender made in 1841 by Norris at Philadelphia

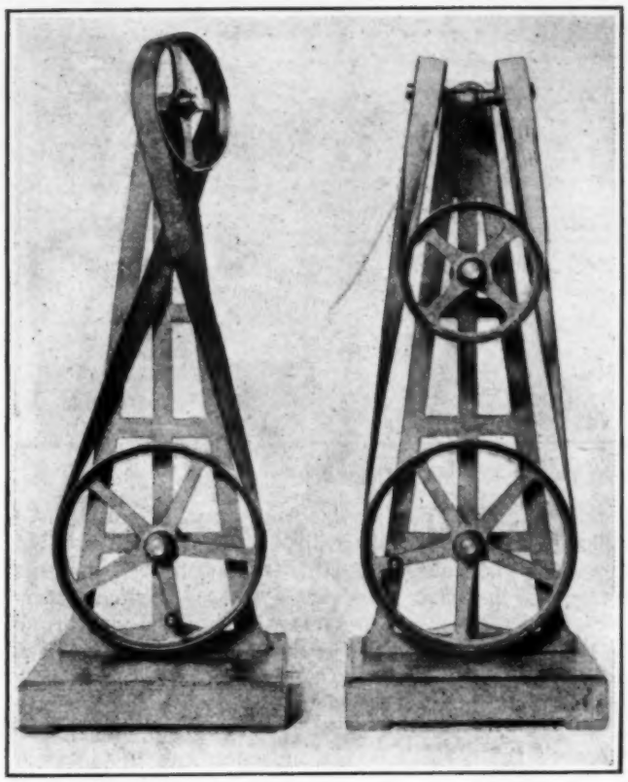


Fig. 8—Transmission of power by belting showing at the left of the shafts not parallel and at the right a means of treating two parallel shafts close together

showing examples of such machines from the hand operated equipment of two hundred years ago down to models of the latest makes.

From the standpoint of historical interest the collections of apparatus used by certain noted French scientists are among the most important. When one stands before these laboratories and sees the instruments used —in many cases exceedingly crude and capable of only very limited accuracy—and then thinks of their remarkable discoveries, one marvels at their ability to overcome obstacles. One of the best of these collections is that of the laboratory of Lavoisier.

As we approach recent days we find objects that have now become of historical importance only although most of the readers of this article will be able to remember when they were counted among the marvels of the day. Such, for example, is the airplane in which the first flight across the English Channel was made and several in which French aces won glory during the great war, but now too slow and too fragile to count in modern competition. In addition to several complete machines there are many models.

Every effort has been made to make the collections, and especially those of modern objects, available for study. The exhibits are arranged so as to be protected and at the same time as available as possible for study. Many of the machines and models have been mounted so as to permit the students to see how the various parts function. The locomotives, like that in Fig. 7, and especially the models of the latest types are mounted on wheels set in the tracks and operated by motors. These wheels drive the engine wheels by friction and so operate the moving parts of the locomotives. The same thing can be said of practically all machines and models used for instruction purposes.

A model of the electric furnace used in France for the refining of metals, especially steel, is small enough to be taken into the lecture hall and used for demonstration purposes in the course in metallurgy.

When a model is too large to be moved with ease to a lecture hall the students, if the class is small enough, may be taken to the Museum to inspect or they can come on Sunday or at any time when the museum is opened. In some instances, on certain specified Sundays, laboratory assistants are present at the museum to operate such models. A good example of this class of models is illustrated in Fig. 13. This represents a blast furnace complete with its stoves, blowers, and other auxiliaries.

Any instructor who has attempted to teach technical subjects knows the difficulty of explaining to students the working of a machine some of whose parts are concealed and the great advantage of having sectioned models to aid his explanations. The museum is well equipped in this respect. With such models as these it is easily possible to explain in a few moments to students the operation of machinery but without them it would take hours. It is also possible to obtain a clearness and comprehensibility that cannot be attained by charts and diagrams.

Of great value also to students of kinematics, mechanics and machine design are the collection of gears, cams and other means of modifying and transmitting motion and power. In these cases, as in the others just described the possibility of the students being able to "see" the important relationships is an interesting feature. While such combinations as those shown in Figs. 9, 10, 11 and 12 may not be frequently met in actual practice, they are interesting forms, more or less difficult to present by means of diagrams and very useful in teaching the general applications to students, generalities which, if once really understood, can be applied in simpler, practical cases. Of more immediate practical applicability are the models of various means of power transmission such as those illustrated in Fig. 8. Moreover, there are excellent models of shafting with various kinds of supports, pulleys of many kinds, different sorts of belts and belt splices, etc. With such models at hand the good and bad points of these details may easily be indicated.

The few illustrations which have been given are examples only of what the museum contains. In the room reserved for lathes for instance, there are 65 different lathes or models. There are not only engine lathes of various types but also lathes used for the cutting of medals, as well as lathes for other purposes.

In the room in which the machine tools and wood-

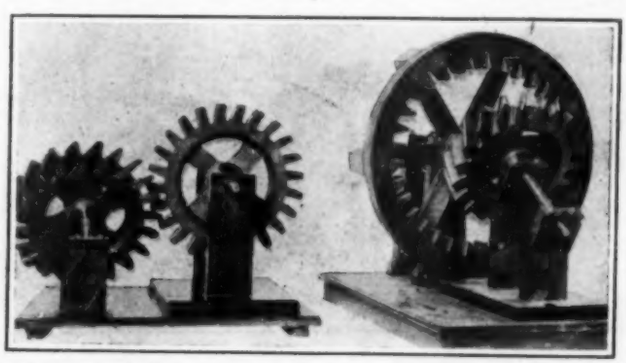
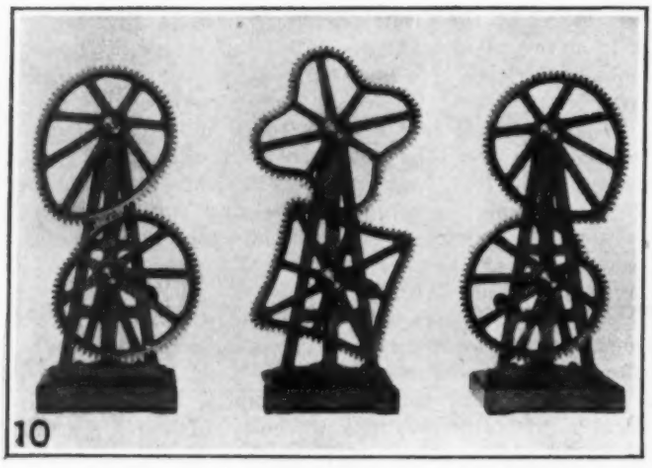
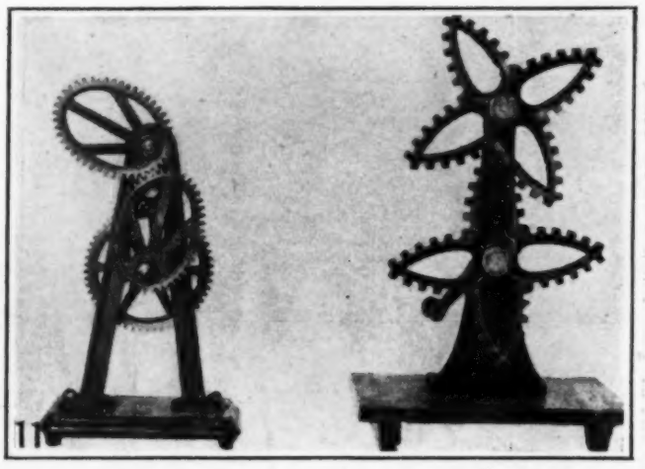


Fig. 9—External and internal gearing connecting shafts not in the same plane





Figs. 10 and 11—Models of various forms of special gearing

working machines exhibits are located may be found: Saws, drill presses, radial drills, planers, shapers, slotters, milling machines, broaching machines, punch presses, gear cutting machines, nail cutting machinery, screw cutters, riveting machines, turret lathes and hydraulic presses. While in the room devoted to mechanical means of power transmission are located: Shafts, supports and bearings, belts, clutches, chains and sprockets, lubricators and oilers.

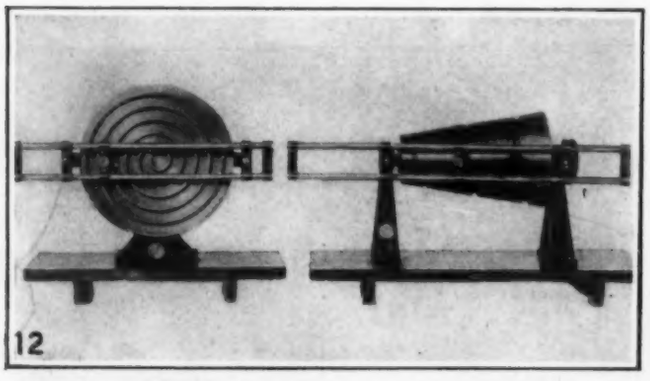
Closely related to the more general forms of mechanical engineering is the manufacture of clocks and watches. The museum has a remarkable collection of old clocks and watches as well as many modern examples, and, in addition an excellent exhibit of the tools and simple machines used in the production of the high grade chronometers for which France is hardly less famous than Switzerland.

Going to the opposite extreme of machines whose characteristics are rather strength and power than delicacy and accuracy, a notable collection of models of engines and other railroad equipment is found. An exhibit of historical interest to Americans is shown in Fig. 7, and another of which, unfortunately, a photograph is not available is that of one of the early American sleeping cars, sectioned to show the interior arrangement. There are also several models of modern locomotives whose use is being developed in France.

Another very interesting part of the museum is the room containing the exhibits of safety devices for the prevention of industrial accidents. In connection with this exhibit and the one just previously described, an interesting incident may be noted. An employee of one of the railroads in France studied several of the courses at the Conservatoire, won his degree of engineer and while there became interested in the problem of safety in railroad operation. He has since done much to develop safety equipment and, though still a young man, is now recognized as one of the authorities on this subject in France.

Space will permit only this very brief description of one of the corners of the museum, and the interest of the readers of this magazine would hardly lead them on to a detailed enumeration of the treasures in the other sections, many of which are more complete and more valuable than those in the field of mechanical engineering. There is no question but that this museum is an important factor in industrial education in France and that it is one of the important collections of Paris, a collection which, unfortunately, is too little known and visited by Americans.

The museum offers also many suggestions which might be utilized if the time ever comes when an industrial museum may be seriously considered as a possibility in the United States. It would be impossible for us to secure the historical exhibits which the museum of the Conservatoire National des Arts et Metiers possesses, but in the field of modern machinery, it should be possible for us to fill a museum with objects of the greatest educational value, for we are today, in the opinion of the author—and he has had occasion during the last year to inspect the industrial equipment of many countries—the industrial leaders of the world.



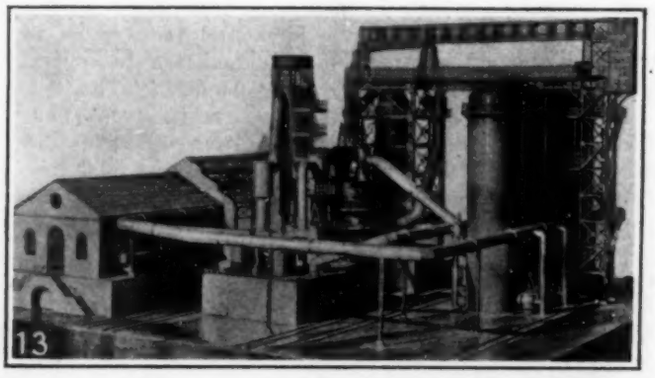


Fig. 12—Two methods of transforming circular motion into rectilinear. Fig. 13—Model of a blast furnace with all auxiliaries

Automotive Production

A Difficult Piece of Machine Work

By Alfred T. Gregory

Finishing the interior of a cylinder casting of unusual shape — Design of the cams that furnish the only guide for the two cutting tools

THE firing domes of the cylinders of the Wright airplane engine are peculiarly shaped. Each dome has two flat surfaces angularly disposed in relation to one another and to the axis of its cylinder, as shown by the cut-open cylinder in Fig. 1. In each of the angular faces are two port holes for the valves. Since it was necessary to incline the valves axially to provide room for the cam shaft and rockers to operate the valves, the under surfaces of the domes had to be given a shape that would provide flat surfaces for the valve seats.

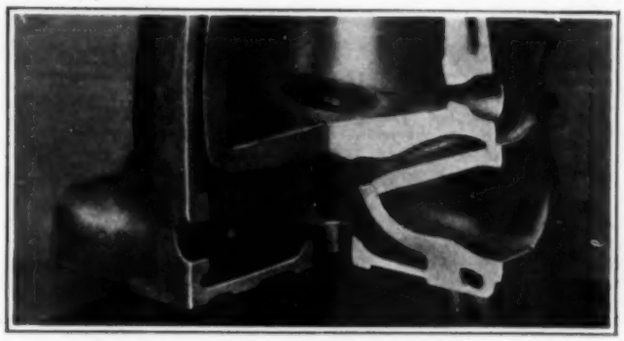


Fig. 1—Cylinder cut open to show the shape of dome

The tool for machining the domes is shown in assembly in Fig. 2. The two cutting blades *A* and *B* are held in holders centrally pivoted to the inner body of the tool, and attached at their outer ends to the connecting rods *C* and *D*, contained in slots running lengthwise of the body. The upper ends of the connecting rods carry the cam rollers *E* and *G*, which are controlled by the stationary cams *H* and *J*. Revolving movement of the cam rollers over the faces of the cams, transmits swinging motion to the cutter blades through the connecting rods to which their holders are attached. In this way they follow the peculiar contour of the casting and produce the desired finish.

The outer case or sleeve of the tool to which the cams are attached, does not revolve, being held by the fork *K* fitting into the cylinder next to the one being operated upon, thus holding it and the cams stationary while the tool proper is revolving.

For properly positioning the tool vertically, the threaded ring *L*, nut *M* and spacers *N* and *O* are provided. The spacer *O* is hardened and ground, and rests on the upper face of the cylinder block. The spacer *N* can be removed and another one of different thickness substituted, thus altering the vertical setting of the tool.

The revolving part of the tool is ground to a running fit in the sleeve, and between the enlarged diameter at the top and the sleeve, the special ball bearing *P* is interposed. The threaded ring *R* engages threads cut on the outside of the cam spacer and is turned to feed the tools to the cut, four radiating handles being provided

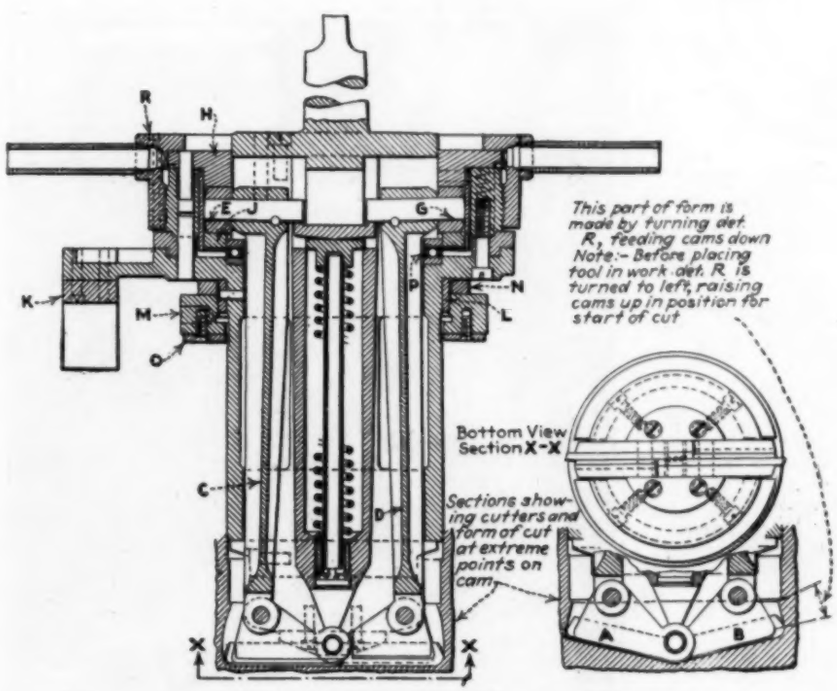


Fig. 2—Assembly of tool used for machining the domes

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for its operation. When the threaded ring has been unscrewed until the outer ends of the cutter blades are clear of the chamber, the whole tool can be lifted out.

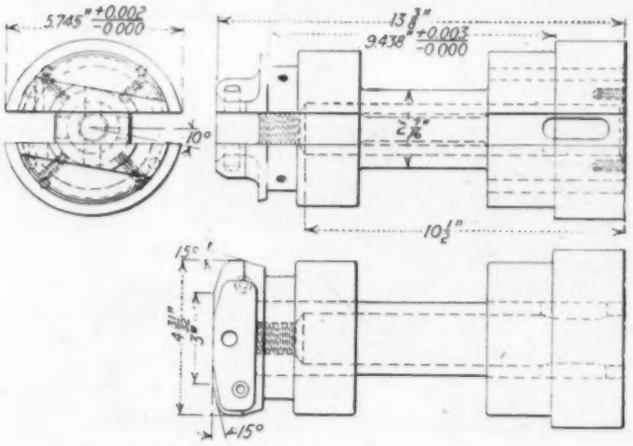


Fig. 3—Body of revolving part of the tool

The body of the revolving part of the tool is shown in detail in Fig. 3. Two diametrically opposed channels *A* and *B* provide spaces for the connecting rods, while a single channel *C* across the bottom and connecting the two vertical channels, gives space for the cutting blades and holders. By cutting away the bottom of the tool at an angle of 10 deg. with the channel, sufficient clearance for the chips is secured without weakening the tool.

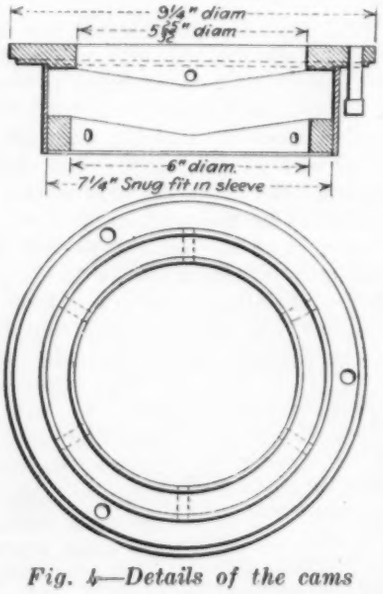


Fig. 4—Details of the cams

Details of the cams are given in Fig. 4, and in Fig. 5 the chart for laying them out is shown.

In Fig. 6 the tool is shown in working position, while in Fig. 7 it may be seen suspended over the end cylinder in the block.

The tool is used in a Colburn heavy-duty drilling machine and when running at 30 deg. r.p.m. the time for finishing the domes is 30 min. per cylinder.

Dia. Divis. Numb.	PART No. 55 a	DIFF.	A		PART No. 57 b	DIFF.	B
0	0.428		0.996		0.000	0.014	0.438
2½	0.426	0.002	0.996		0.014	0.016	0.452
5	0.425	0.001	0.995		0.030	0.020	0.468
7½	0.423	0.002	0.993		0.050	0.020	0.488
10	0.420	0.003	0.990		0.070	0.020	0.508
12½	0.417	0.003	0.987		0.090	0.020	0.528
15	0.413	0.004	0.983		0.110	0.019	0.547
17½	0.408	0.005	0.978		0.129	0.018	0.565
20	0.402	0.006	0.972		0.147	0.018	0.583
22½	0.396	0.006	0.966		0.165	0.018	0.601
25	0.389	0.007	0.959		0.183	0.018	0.621
27½	0.381	0.008	0.951		0.201	0.017	0.638
30	0.373	0.008	0.943		0.218	0.016	0.654
32½	0.363	0.010	0.933		0.234	0.015	0.672
35	0.353	0.010	0.923		0.253	0.015	0.688
37½	0.342	0.011	0.913		0.268	0.014	0.703
40	0.332	0.011	0.901		0.282	0.014	0.717
42½	0.320	0.012	0.890		0.296	0.014	0.731
45	0.307	0.013	0.877		0.310	0.013	0.745
47½	0.293	0.014	0.863		0.323	0.012	0.756
50	0.279	0.014	0.849		0.335	0.011	0.770
52½	0.265	0.014	0.835		0.343	0.010	0.781
55	0.250	0.015	0.820		0.353	0.010	0.791
57½	0.234	0.016	0.804		0.363	0.010	0.801
60	0.218	0.016	0.788		0.373	0.008	0.811
62½	0.201	0.017	0.771		0.381	0.008	0.819
65	0.183	0.018	0.753		0.389	0.007	0.827
67½	0.165	0.018	0.735		0.396	0.006	0.834
70	0.147	0.018	0.717		0.402	0.006	0.840
72½	0.129	0.018	0.699		0.408	0.005	0.846
75	0.110	0.019	0.680		0.413	0.004	0.851
77½	0.090	0.020	0.660		0.417	0.003	0.855
80	0.070	0.020	0.640		0.420	0.003	0.858
82½	0.050	0.020	0.620		0.423	0.002	0.861
85	0.030	0.020	0.600		0.425	0.002	0.863
87½	0.014	0.016	0.584		0.426	0.001	0.864
90	0.000	0.014	0.570		0.426		0.864

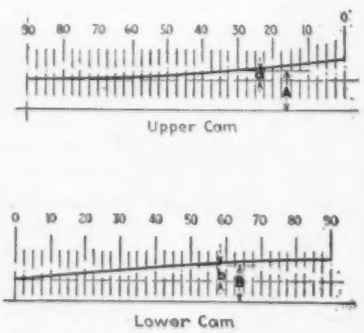


Fig. 5—Chart for laying out the cams

Fig. 6—The tool in operating position

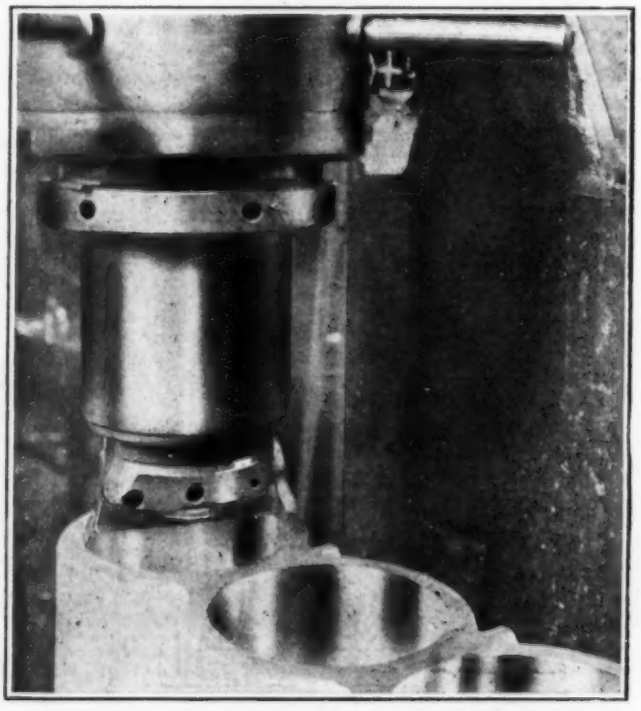


Fig. 7—The tool withdrawn from the cylinder

AUTOMOTIVE PRODUCTION

Parts Nomenclature for Three-Speed Transmission

Standardized terms suggested by a committee of the American Gear Manufacturers' Association

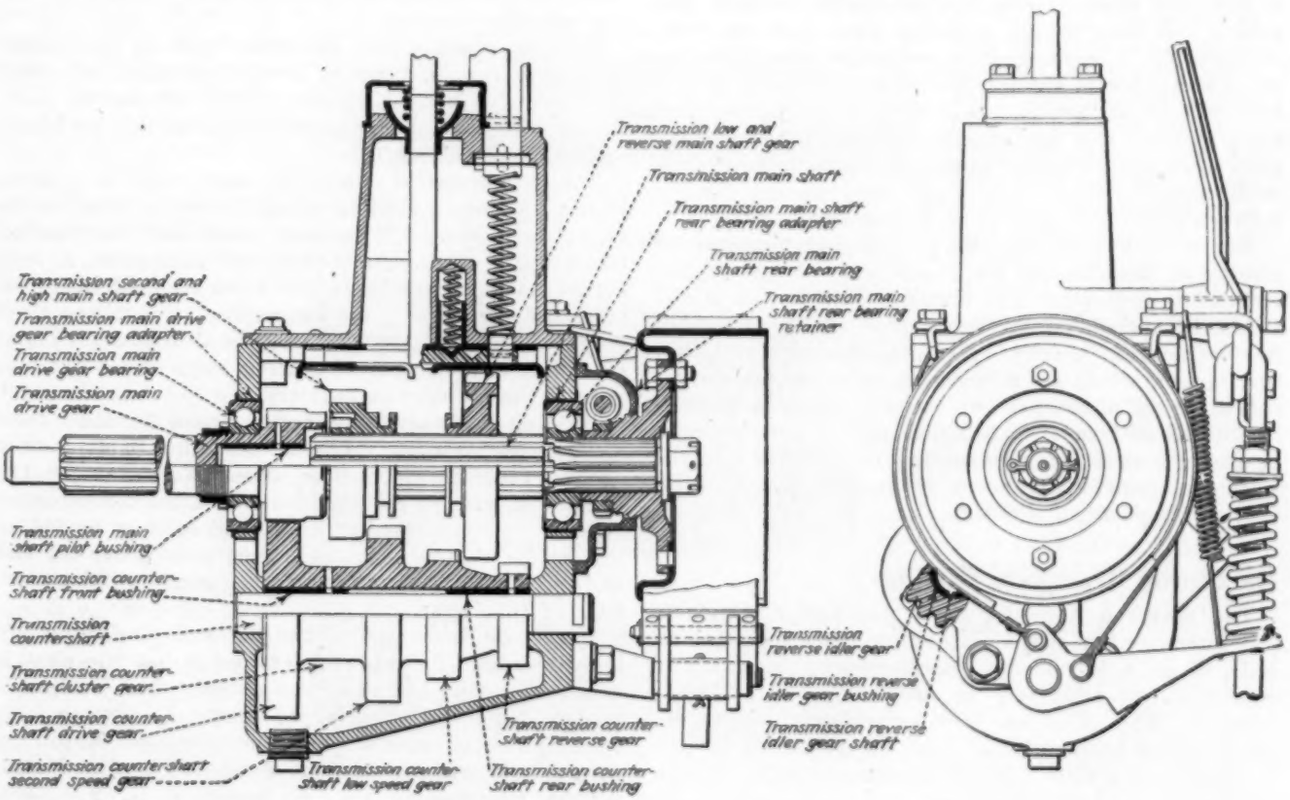
FOR the past year, the Committee of the Differential and Transmission Division of the A.G.M.A. has been collecting data from various transmission and motor car manufacturers, in an endeavor to establish a standard nomenclature for certain parts of conventional three-speed transmissions. While the need of such a standard is beyond dispute, the greatest difficulty in getting the various manufacturers to adopt such a standard will probably be the annoyance and cost in making the necessary changes from the nomenclature now used by them, individually.

Immediate Action Needed to Eliminate the Variations in Terminology Now Current

The Committee feels that some standard should be agreed upon, and that it should be adopted as soon as possible. There are some manufacturers, however, that may not be able, for various reasons, to fall into line at this time, but if a standard agreeable to the majority, is proposed, it should not be long before it would be universally adopted.

In order that there may be something tangible to work upon, the nomenclature presented herewith is suggested. The Committee will, no doubt, be glad to receive comments upon the subject from all manufacturers that may be interested. Communications should be addressed to the chairman, S. O. White, Warner Gear Co., Muncie, Indiana.

1—Transmission main drive gear.
2—Transmission main drive gear bearing (front and rear if two).
3—Transmission main drive gear bearing adapter.
4—Transmission main drive gear bearing retainer.
5—Transmission second and high main shaft gear.
6—Transmission low and reverse main shaft gear.
7—Transmission main shaft.
8—Transmission main shaft rear bearing.
9—Transmission main shaft rear bearing adapter.
10—Transmission main shaft rear bearing retainer.
11—Transmission countershaft.
12—Transmission countershaft cluster gear.
(If a built-up cluster, use the following nomenclature for items 13, 14, 15 and 16.)
13—Transmission countershaft drive gear.
14—Transmission countershaft second speed gear.
15—Transmission countershaft low speed gear.
16—Transmission countershaft reverse gear.
17—Transmission reverse idler gear.
18—Transmission reverse idler gear bearing.
18A—Transmission reverse idler gear bushing (if plain).
19—Transmission reverse idler gear shaft.
20—Transmission main shaft pilot bearing.
20A—Transmission main shaft pilot bushing (if plain).
21—Transmission countershaft front bearing.
21A—Transmission countershaft front bushing (if plain).
22—Transmission countershaft front bearing retainer.
23—Transmission countershaft rear bearing.
23A—Transmission countershaft rear bushing (if plain).
24—Transmission countershaft rear bearing retainer.


Transmission low and reverse main shaft gear
Transmission main shaft
Transmission main shaft rear bearing adapter
Transmission main shaft rear bearing
Transmission main shaft rear bearing retainer
Transmission second and high main shaft gear
Transmission main drive gear bearing adapter
Transmission main drive gear bearing
Transmission main drive gear
Transmission main shaft pilot bushing
Transmission countershaft front bushing
Transmission countershaft
Transmission countershaft cluster gear
Transmission countershaft drive gear
Transmission countershaft second speed gear
Transmission countershaft low speed gear
Transmission countershaft reverse gear
Transmission countershaft rear bushing
Transmission reverse idler gear
Transmission reverse idler gear bushing
Transmission reverse idler gear shaft

Conventional transmission assembly

AUTOMOTIVE PRODUCTION

Abstracts

from other publications

Wage Incentives

In discussing how the automotive industry is approaching the wage-payment program, Norman G. Shidle states that a prime requisite of a successful wage system is that it gives satisfaction to the workers, and unless it has the approval of the employees it can't be of maximum value. That is the studied opinion of practically every production man who has given any considerable thought to the subject. Sometimes the psychological elements of the wage-payment system are neglected, as when a wage-incentive system is decided upon and the incentive is later on removed in its administration. The workman should be able to calculate readily how much money is coming to him. The relation between the reward and the effort should be direct and continuous. The reward should be directly and visibly dependent upon individual effort in so far as possible. Where incentives are on a group basis, the group should be small enough for the individual to see and feel very definitely the effect of his personal efforts on the group achievement. The wage system should take into account the desire of the management for quality as well as quantity production and should take care of the long continuous service on the part of the individual employee. Considering the relative newness of incentive wage systems, the automotive industry has gone a long way toward utilizing them constructively. A survey of 21 representative companies show that five use a group bonus system; five, individual piece work; four pay on an hourly basis; two use a group piece work system; two are equally divided between group piece work and individual piece work; one uses a differential premium bonus system and one is equally divided between individual piece work and an hourly basis.

Not until 1918 did the idea of grouping workers and placing an incentive for the group come into use in the automobile industry. The first installation was at the Oakland plant where the Wennerlund group bonus plan was introduced in 1918. Mr. Wennerlund states that this system offers an inducement to employees to get out a bigger production; it rewards them in proportion to their rate of production and it automatically furnishes a means for measuring the efficiency of the workman, individually or in groups.—*Automotive Industries*, Sept. 24, p. 495.

Machining Rear Axle Castings

The Smith & Coventry Co., Manchester, England, has introduced a special lathe for operating at both ends of an axle housing simultaneously in order to obtain perfect alignment by machining the two ends together. This effect has been accomplished by employing a central headstock for chucking the casing in conjunction with a right and left hand turret lathe on each side of the central member.

The most interesting feature of the machine is naturally the head-stock, since within the comparatively short space occupied by this unit it is necessary to provide two special chucks and two journal bearings, moreover, the hollow spindle must be of considerable diameter to admit the center of the housing, while chucks must be made to obtain a quick action in gripping the comparatively small diameter of the rear axle tube.—*The Automobile Engineer* (England). Sept., 1925, p. 300.

Welding Processes

P. M. Heldt discusses the various systems of machine-welding that have come to play a very important rôle in the manufacture of motor vehicles. Gas welding and electric welding are the two systems now in general use. The first of the electric-welding processes to come into extensive use was the butt-welding process. Later the two systems of arc welding by the carbon arc and the metallic arc, respectively, were developed to a practical stage, and finally came the spot-welding process which is now so widely used in the fabrication of sheet-metal parts. Flash welding is merely a variation of the butt-welding process. Welding is at present widely used for the reclamation of imperfect castings, forgings and pressings.

Oxy-acetylene welding or gas welding is being used as well as a process known as semi-arc welding. This later process, permits of welding light cast-iron sections without the necessity of pre-heating the block.

Much of the steel tubing used in automotive construction is welded by the oxy-acetylene torch. The material is originally in the form of flat strips, which is rolled into tube form and the joint is then welded by the oxy-acetylene process.

Welding plays a very important part in the manufacture of certain types of aircraft engines, of which the Liberty is a good example. The cylinders of these engines are really built up from forgings and pressings by means of welding.

The oxy-acetylene torch is used with a process known as bronze welding which is very similar in its effects to brazing. It is used particularly for joining castings or castings and forgings and gives a very secure joint, as may be judged from the fact that it is employed for welding the supporting arms to the Ford engine. The oxy-acetylene torch is also used for metal cutting, and a number of cutting applications are met with in the automotive industry.

Welding equipment is sometimes used for other than welding purposes, such as merely heating parts so they can be readily reformed in dies. For example, the gear shift lever of the Cadillac car of the ball-mounted type is first machined straight and is then heated in an electric welding machine immediately above the ball to bend it into a die to the form somewhat characteristic of this lever.

Rear axle housings of the pressed steel type are usually welded by the acetylene torch but the electric process is more and more being used. Arc welding is employed in the majority of instances though butt welding is coming into use. The Chevrolet Motor Co. uses this process which was developed by the Metropolitan Engineering Co., of Brooklyn, N. Y.—*Automotive Industries*, Sept. 24, p. 506.

Automatic Arc Welding in Tank Construction

By W. L. Warner
Industrial Engineering Dept., General Electric Co.

Automatic hand welding—Tests on hand and automatically welded tanks—Factor of safety —Specifications for the design of welded tanks

THE difference between hand welding and automatic welding of pressure tanks is very strikingly shown by some tests made by the York Manufacturing Co. at York, Pa., in 1921.

The material for four tanks 16 in. in diameter and 6 ft. long, of ¼-in. plate was prepared and sent to several companies for welding. Three of these tanks were welded by hand and the fourth by the automatic arc welding process. The welded tanks are shown in Fig. 2. Tank *C* is automatically arc welded.

These welded tanks were tested to destruction as follows: A blow of 100 ft. lb. (10-lb. weight dropped 10 ft.) was given each tank at each of the five points shown by arrows in Fig. 2 at *A*. These blows had no visible effect on the welds. Each tank was then subjected to 500 lb. hydraulic pressure, followed by 300 lb. of air pressure under water. No leaks developed under this test.

Hydraulic pressure was then applied to each of the tanks until it burst. In every case the rupture occurred in the longitudinal weld. Fig. 3 shows the bursting pressures and places of failure of the tanks.

It will be noted that tank *C* failed at the highest pressure of all, namely, 2,200 lb. The shell fiber stress at bursting of this tank was 70,400 lb. per square inch. The weakest tank of the lot burst at 1,350 lb. which gives a stress of 43,200 lb. per square inch in the shell at the time of rupture. From these figures then we see that the safe stresses of 40,000 lb. per square inch for hand welding and 50,000 lb. per square inch for automatic welding upon which the preceding values of *C* in Formula 2 are based, are well within safe limits.

Microscopic studies of the metal in the welds of the four tanks showed that the tank *C* which had the highest bursting pressure had the smallest grain structure, and the one with the lowest bursting pressure had a considerably larger grain and distorted structure. Fig. 4 shows the appearance of the welds in the four tanks.

Sections *A*, *B*, *C* and *D* show the welded joints in the tanks having corresponding numbers. There is a perfect union between the original and the added metal in all of them, but there is considerable difference in the size of the grains in the weld.

Section *E* shows spots of impurities in the weld and is typical of all the samples examined, but there were less spots in that from tank *C* than any of the others.

Section *G* is the normal structure of the steel from which the tanks were made.

As an additional corroboration of this test just described, another tank (7 ft. x 20 in. x ⅜ in.) was welded and tested. The longitudinal seam was welded with the automatic welder. The deposited metal had little or no reinforcement and was as nearly as possible flush with the sheet. One of the circumferential seams was welded with the semi-automatic welder and the other with the hand-welding process. Fig. 5 shows this tank before and after test. Hydraulic pressure was applied to the tank until it burst at 2,350 lb. per square inch, no leaks being visible before the tank failed.

It is interesting to note that the designed working pressure for these five tanks was 200 lb., but applying Formula 2 with the value of *C* as 1,666⅔ from the table we find that the safe working pressure for this last tank tested is 375 lb. On this basis then the actual factor of safety was 6¼, which means that the shell fiber stress at rupture was greater than 50,000 lb. per square inch. Actually it was 62,667 lb. per square inch.

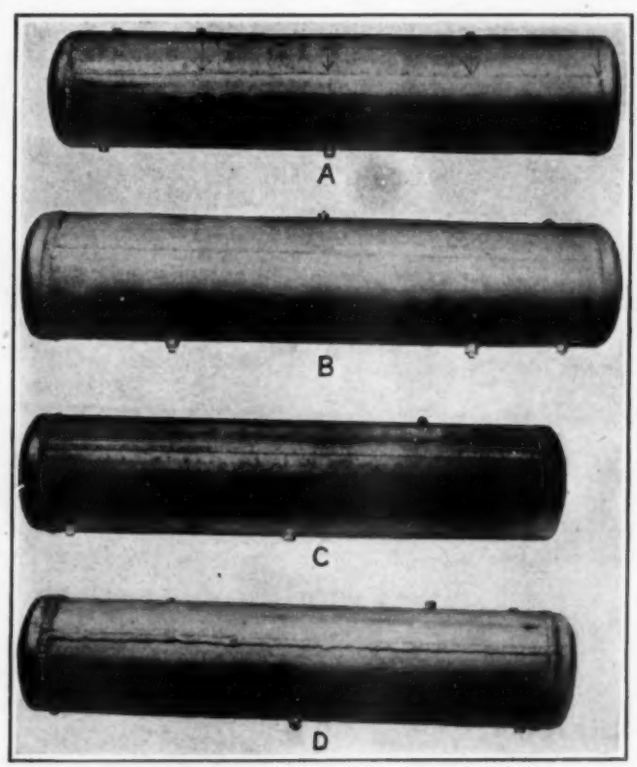


Fig. 2—Pressure tanks welded with the electric arc

Conclusion of the article.

In 1922 some tests were made at the University of Wisconsin by Prof. R. J. Roark on hand-welded tanks of ⅜-in. material and 16 in. in diameter, varying in length from 2 to 10 ft. From these tests it was found that the weakest points in the welded pressure vessels apparently were located where the couplings and nipples were welded in.

The Bureau of Standards also drew the same conclusions from tests made in their laboratories to compare welded pressure tanks with riveted tanks. These tanks were 4 ft. in diameter, 10 ft. long and made of ⅛-in. mild steel plate. The ends of the tanks were spherical, having a radius of 4 ft. The designed working pressure was 200 lb. with an allowable working fiber stress of 16,000 lb. per square inch.

These tanks failed at very low pressures and it was found that their failure was due to poor welding. The importance of careful welding about fittings will be readily recognized when it is understood that the holes cut for such fittings are points of discontinuity in stress distribution, and that, as a result of such interference with the stresses in the plate, excessively high concentrated stresses are developed in the material bordering the opening.

During the latter part of 1922 and early in 1923 the pressure vessel committee of the American Bureau of Welding made an extensive series of tests on both gas-welded and electric-arc welded pressure tanks. Space does not permit of a detailed description of these

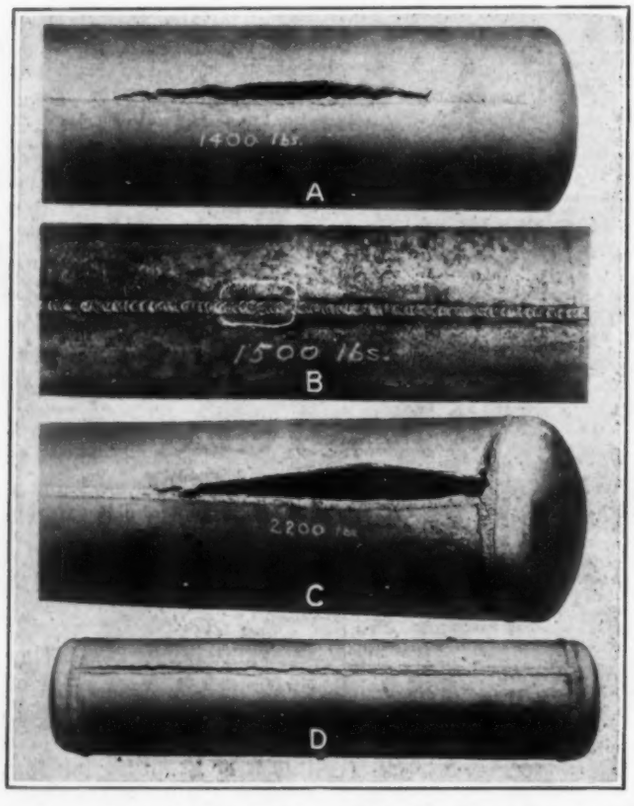


Fig. 3—Electric-arc welded pressure tanks after destruction

tests and the various types of tanks tested but the conclusions arrived at by the Committee from the results of these tests may prove interesting.

The following is quoted from the report of the pressure vessel committee dated June 1923:

"The Code specifies 55,000 lb. per square inch as the maximum tensile strength. This figure is the minimum tensile strength of boiler-code steel, and the Code provides that where such steel is used for riveted vessels, a maximum working fiber stress of 11,000 lb. per square inch shall be used. This procedure means a factor of safety of 5. The tensile strength of all the regular tanks was—maximum 52,300; minimum 48,700; average 50,100.

The minimum is only 2.8 per cent less than the average. It seems quite fair and safe, therefore, to use 5,000 lb., as the basis for design. With a factor of safety of 5 and a weld value of 80 per cent, this would mean a design fiber stress at the working pressure of 8,000 lb., based on the nominal plate thickness."

The tests made by the pressure vessel committee on welded tanks show that the safe maximum design stress is 50,000 lb. per square inch. Assuming the average tensile strength of a weld is 80 per cent of the strength of the tank steel then the maximum allowable breaking stress for design of welded tanks is 40,000 lb. per square inch, which is exactly the figure mentioned in the first part of this article. With a factor of safety of 5 the maximum allowable working fiber stress is 8,000 lb. per square inch. For an automatic weld however we have seen that this safe working fiber stress is 10,000 lb. per square inch.

Length of "Skirt" and Amount of Crimping

The recommendations of the pressure vessel committee on this point have already been referred to. The Boiler Code requires that "heads convex to the pressure shall have a skirt not less than 3 in. long," but the Committee felt that this length is impractical for the small sizes and also the length of skirt should bear some relation to the diameter of the head. These recommended sizes are given in the first half of this article.

The reasons for these sizes are noted in the following quotation from the report of the Committee:

"It may be pointed out that up to the yield point there is no stress on the weld of a convex head, except shear, and that any length of skirt that insures this condition is enough. Also that with a concave head, the first part to show yield point stresses is near the knuckle so that here again any reasonable practical length is sufficient, anything longer not making the tank any stronger."

With regard to crimping the end of the tank shell over the head the following quotation from the report of the Committee gives definite recommendations:

"The Committee believes that the constructing or crimping of the end of the shell is unnecessary, and therefore should not be required . . . In neither the Bureau of Standards tests, Professor Roark's tests, nor in those of Professors Fessenden and Bradford is there any evidence to show the crimping is advantageous.

"Also, since no formula applies beyond the elastic limit, there is no need of crimping, the effect of which, if any, can begin only after distortion begins."

Angle of Bevel Recommendations

With regard to the angle of bevel the committee report gives the following:

"All longitudinal seams shall be of the 90-deg. double-V type. Girth and head seams may be of the 90-deg. single-V type.

"When the thickness is ¾ in. or less, beveling of the

longitudinal seams may be omitted, and when the thickness is less than ¼ in., the girth and head seam need be beveled on one side only, to an angle of 45 degrees."

The tanks tested by the committee were hand welded so that the above recommendation may be satisfactory

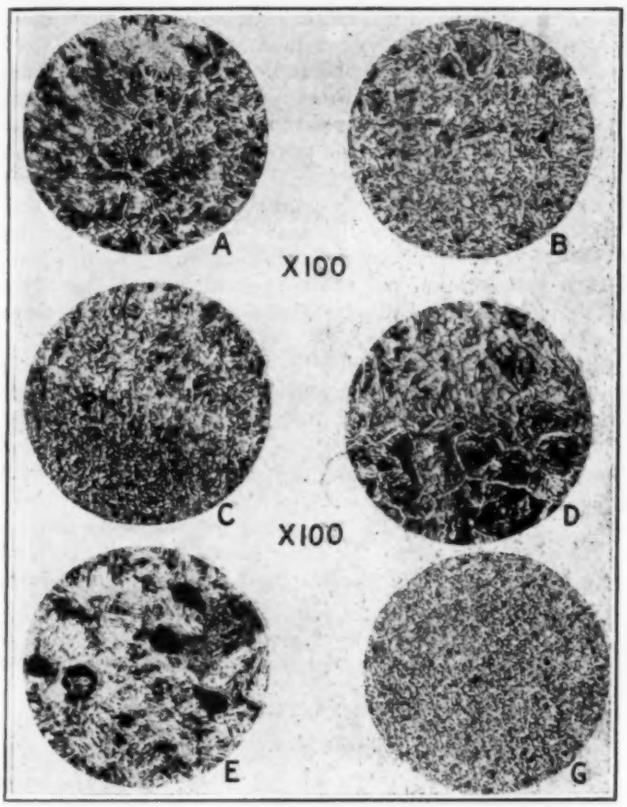


Fig. 4—Microscopic structure of the welds in the tanks

from that standpoint. However, tests of tanks welded with the automatic welder indicate that a single-V weld is satisfactory for longitudinal seams. Even with hand welding there is some question as to whether the double V is necessary when experienced welders do the welding, and it is the writer's contention that on any work of this nature the welders must be trained men and capable of producing a uniform quality of work.

Reinforcement of Welded Seams

The amount of reinforcement of the welded seams is specified very definitely by the committee in its report:

"Double-V seams shall be reinforced to a total thickness of at least 1½ times the plate thickness, and single V welds to an amount equal to not more than 20 per cent of the plate thickness.

"The amount of reinforcement on a weld is of some importance as the usual weld is weaker per square inch of section than the plate.

"It has been found with ordinary wires in practice that the amount of reinforcement necessary always to break low tensile strength plate varies from 25 to 50 per cent of the plate thickness in a double-V weld. In girth seams, which can safely be made of the single-V type, the stress is very low and the amount of reinforcement need not be so great."

It is interesting to note that the tests made on the automatically arc welded tanks at York, Pa., show that a single-V weld made with an automatic arc welder does not require any reinforcement to speak of. The uniformity of the metal deposit and its freedom from slag and blowholes increase the strength of the weld sufficiently to eliminate the need for anything like the reinforcement suggested by the Committee.

When attaching nozzles or nipples to the shells of pressure vessels the committee recommends the following:

"Nozzles, nipples, or pipe connections may be applied as shown in Fig. 6. Other equivalent constructions may be used. All pipe nipples welded into shells shall be of extra heavy pipe thickness, and those with shouldered ends may be either machined, or made by flaring the end of extra heavy pipe.

"The size and radius of fillet on outside of shell shall be as shown in Fig. 6, at *C*.

"Nipples welded into tanks may be threaded internally or externally for pipe connections."

With regard to countersinking the hole in the shell of the tank the committee makes the following recommendations:

"The committee believes that by omitting the countersinking of the hole, thus making the angle 90 deg., the ease of making a good weld is much increased, and the constructions shown in Fig. 6 are much preferred.

"While the committee is opposed to the 45-deg. V around pipe nipples, yet where the nipple is shouldered inside the tank, there is no danger of its blowing out, and hence they do not recommend prohibiting the design. Where there is no inside shoulder the committee believes the design should not be permitted.

"The committee recommends the use of extra heavy pipe for all nipples welded into shells. A suggested standard fillet is shown in Fig. 6 at *C*."

The pressure vessel committee recommends the following approximate chemical analysis as a specification which will fit all cases:

Carbon	0.15 per cent maximum
Manganese	0.30 per cent to 0.60 per cent
Phosphorus	0.04 per cent maximum
Sulphur	0.05 per cent maximum

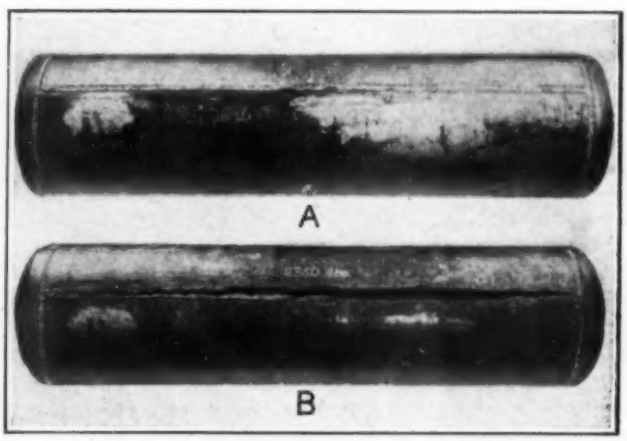


Fig. 5—Arc-welded pressure tank before and after testing

Nothing is said about the chromium, nickel, or silicon contents but high grade steel is necessary.

The electrode used for the arc welded tanks were of the usual type of bare wire and had a maximum of 0.147 per cent of carbon and 0.156 per cent of manganese. They were all low in phosphorus and sulphur.

There is nothing in the tests to indicate that differences in the compositions of the welding wires had anything to do, with the results. The criterion should be that the wire flow freely and smoothly and without detrimental action. The chemical composition alone is not a guarantee of good quality.

SATISFACTORY TESTS FOR WELDED PRESSURE VESSELS

The A.S.M.E. code for Unfired Pressure Vessels specifies the following hydrostatic test:

"Each vessel constructed under these rules shall be tested under hydrostatic pressure to 50 lb. in excess of the maximum allowable working pressure when same does not exceed 100 lb. and to 1½ times the maximum allowable working pressure above 100 lb., except that the vessels with fusion-welded joints shall be tested to three times the working pressure, and enameled vessels shall not be tested in excess of the working pressure."

With special reference to welded pressure vessels the code further specifies a hydrostatic hammer test as follows:

"While subject to the hydrostatic pressure hereinbefore specified, a thorough hammer or impact test shall be given. This impact test shall consist of striking the sheet on both sides of the welded seam a sharp vibratory blow with a 2-lb. to 6-lb. hammer with a handle similar to a blacksmith's striking hammer, the

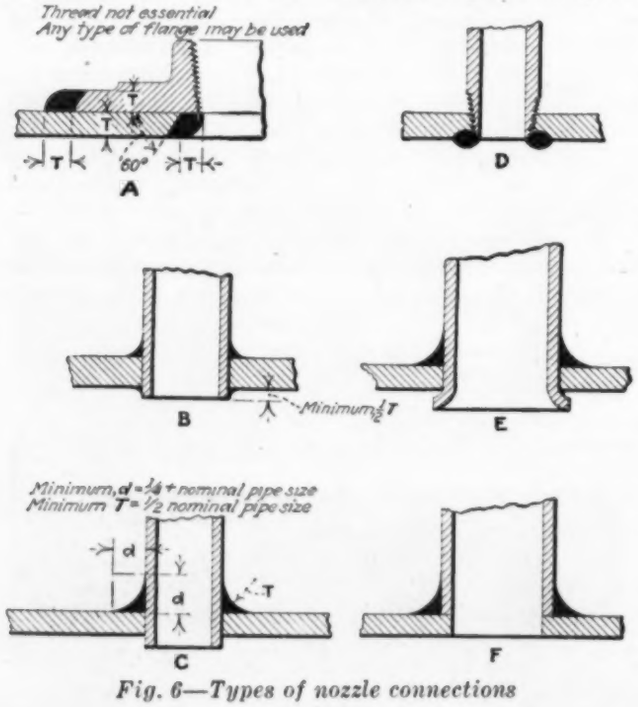


Fig. 6—Types of nozzle connections

blows to be struck 2 to 3 in. apart and within 2 to 3 in. of, and on each side of, the seam—the blows to be as rapid as a man can conveniently strike a sharp, swinging blow, and as hard as can be struck without indenting or distorting the metal of the sheet. During this test the shell shall be completely filled with water."

The hydrostatic hammer test undoubtedly possesses some value for testing pressure tanks as any serious weaknesses will readily be found by employing this test. However, the pressure vessel committee has gone on record as recommending that:

"After the hydrostatic hammer test, as recommended by the A.S.M.E. Code, has been applied, the hydrostatic pressure be increased to 3 times the working pressure and held for 3 minutes. If a pressure vessel passes these tests then it should be accepted."

For hand-welded pressure tanks a test pressure of 3 times working pressure will put a stress of 24,000 lb. per square inch in the shell of the tank which is not sufficient to cause permanent injury. However, the use of a test pressure 3 times working pressure on an automatically welded tank or a tank with a seamless shell would put stresses of 30,000 lb. per square inch and 33,000 lb. per square inch respectively in the tank shell. While these stresses might not be quite sufficient to cause serious injury to the tank material they are close to the yield point of the material (about 30,000 to 35,000 lb. per square inch) and should not be used. On this basis, therefore, a test pressure of 2½ times working pressure is a maximum sufficient for any pressure tank where the longitudinal seam is welded with the automatic arc welder and also for seamless shell pressure tanks.

In this article the writer has attempted to illustrate how the automatic arc welder may be applied to the design and production of welded tanks. For straight seam work it is unexcelled in speed and quality and where pressure is encountered an automatic weld will give 100 per cent efficiency without undue reinforcement of the joint. The operation of the apparatus is automatic so that the resulting product is uniform and of sufficient strength to withstand the service required.

Examine the Purchasing Department Before Ordering

BY W. EDWARD

When an odd item of material is needed in the shop and cannot be found in the stores or in the shop cribs the best place to look, in an emergency, is in and about the purchasing department office.

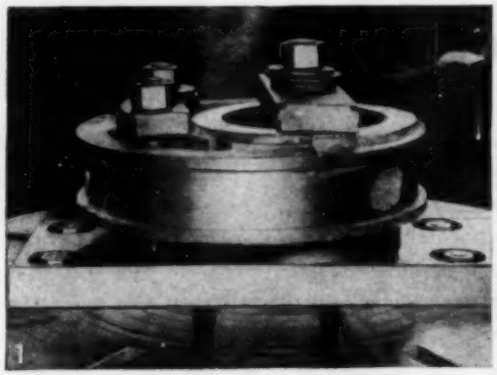
Saw blades, for example, and other flat items such as sections of belt, special grades of steel plate, and brake lining will usually be found in one or more of the drawers in the agent's desk. They may be under papers and folders—but they will be there.

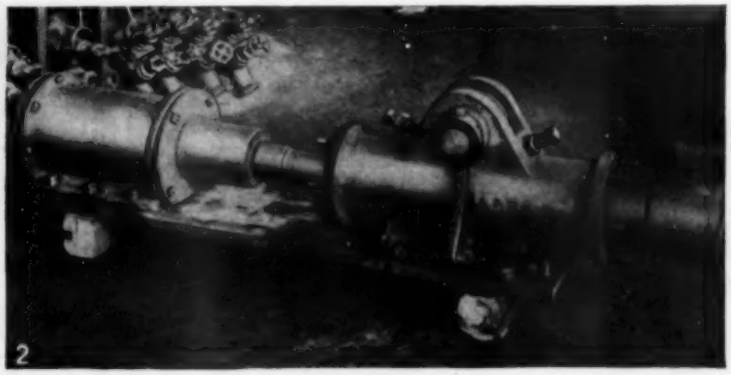
Or perhaps a bit of special oil is needed, or a small amount of paint, or belt dressing, or rust preventive, or boiler compound. Such items are most likely grouped in their several bottles, cans, tubes, and containers on top, under, and inside of the book cases and filing cabinets, furniture originally purchased to hold catalogs and department data—and for miscellaneous storage.

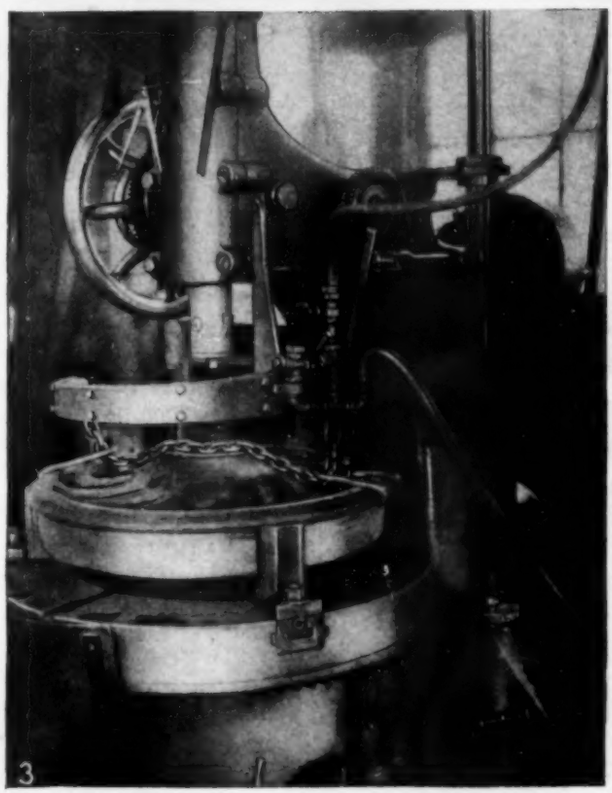
Sometimes the very thing needed will be in front where it can be seen but if it is not it should be sought for back of, or under, the books and folders. Shelves, projecting door lintels, window sills and the space back of radiators constitute handy, out-of-the-way, crowded storages.

But where do all these items come from and why are they not in regular stores? The answer can be given in two words—salesmen's samples. The reason that they are not in stores is because there is seldom an adequate system for disposing of them.

A more fruitful field for co-operation between shop engineer and purchasing agent would be hard to find where more real good could be accomplished than this one, by way of justice to the vendor and a real knowledge on the side of the prospective user as to the relative merits of submitted samples.







Modern Devices from Railroad Shops

as shown at the

American Railway Tool Foreman's Association Convention

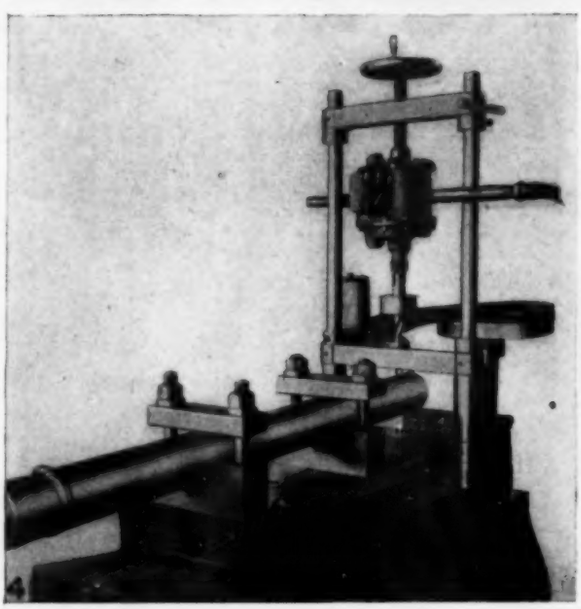
1—Fixture for turning locomotive eccentrics to proper throw

2—Pneumatic device for removing grate-shaker pistons

3—Air hoist and crane arm of car-wheel boring machine

4—Machine for drilling and milling slot in piston rods. Note feed belt and pulleys for moving rod against milling cutter. Also lower support for milling cutter

5—Support for projecting tool used in planing mud rings



The New Cadillac Foundry

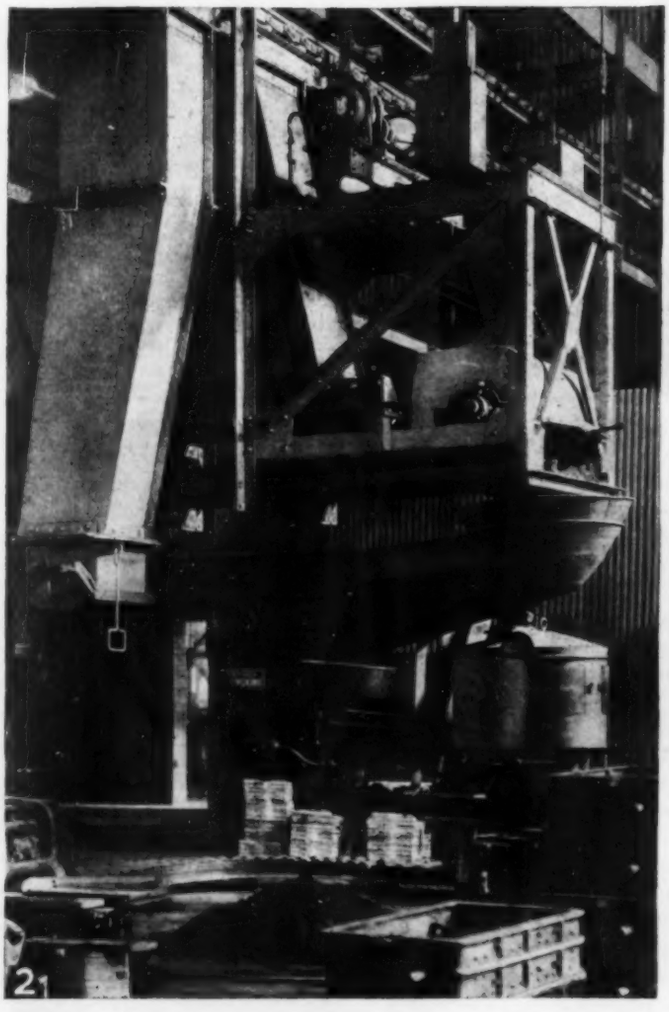
1—Sand storage shed. A traveling crane delivers sand to the various compartments directly from the freight cars with a 5-ton grab bucket. Core sand is delivered from the bottoms of the hoppers by means of measuring gates directly into the sand mixers. At the far end, facing sand is delivered into mixers in the same way

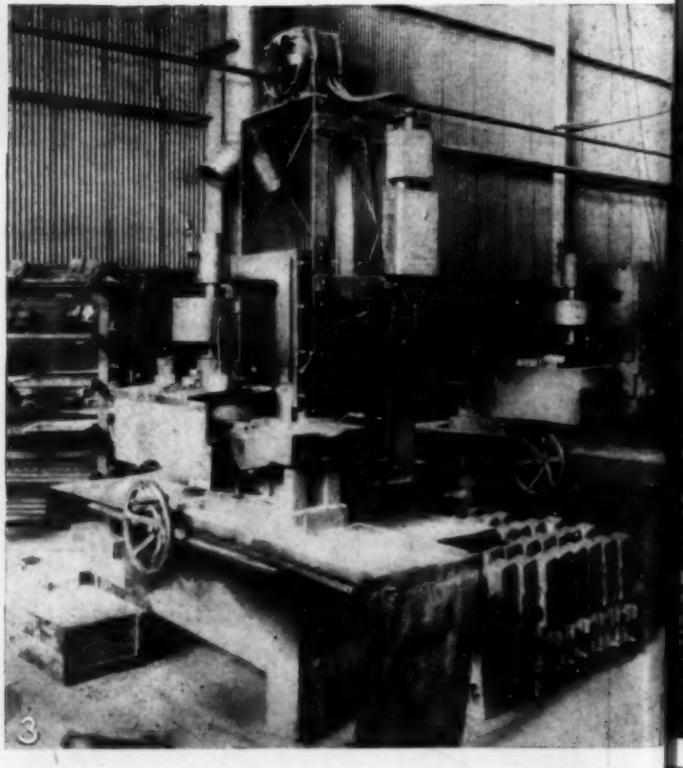
2—View of sand conveyor over cylinder-molding floor, and short sub-conveyor which feeds the sand slinger and rams the copes and drags of cylinder molds. This room is the cylinder-molding floor in the iron foundry proper

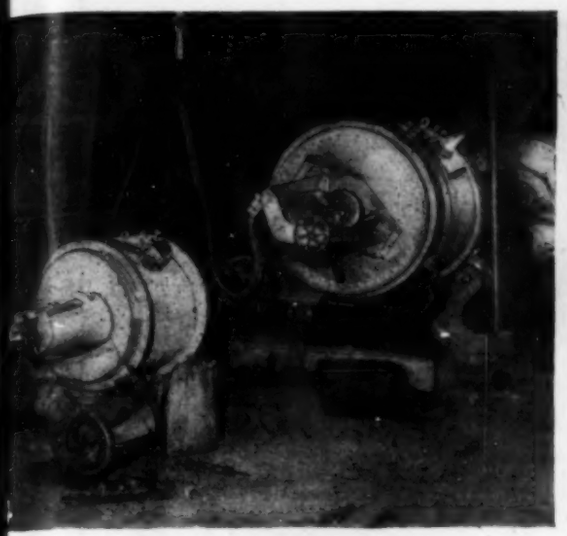
3—Two of the grinding machines used for surfacing the joints of cores for precision in setting

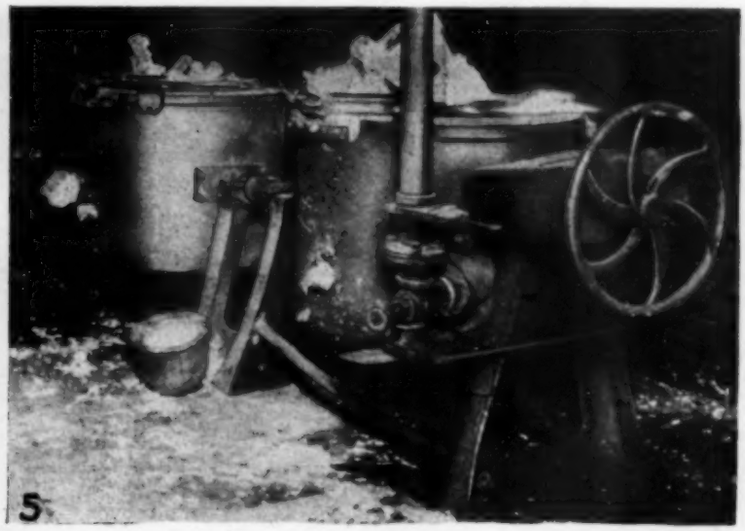
4—Portion of the brass-melting room. Two Detroit electric furnaces of 200-lb., and two of 800-lb. capacity each

5—Portion of a battery of aluminum melting furnaces, of the tilting type and oil-fired









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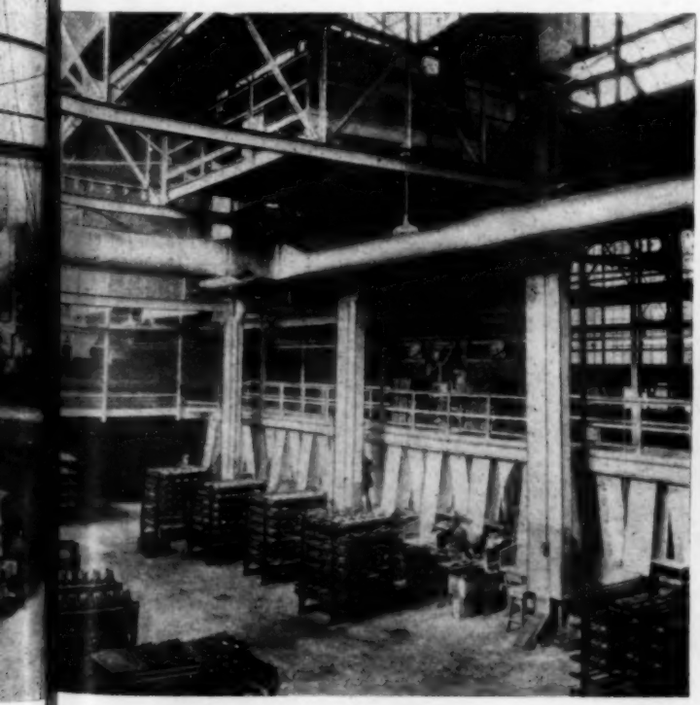
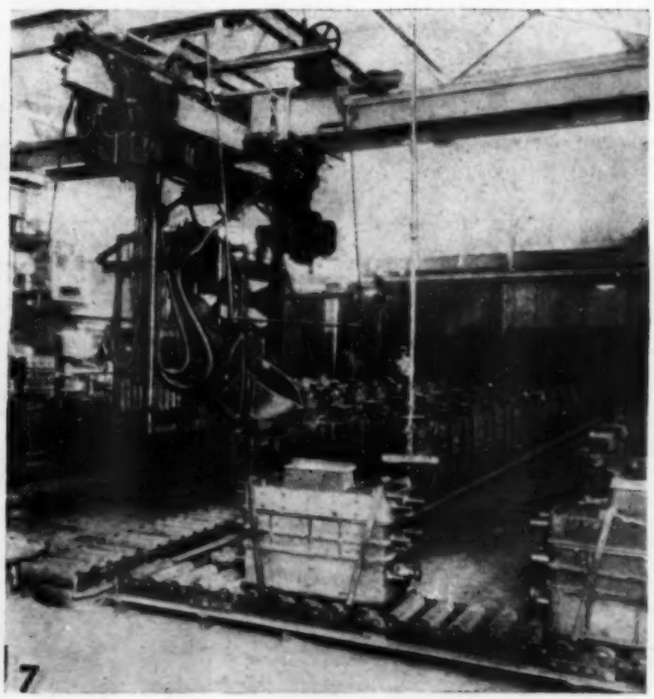
6—Portion of the core room, showing the gallery with Cleveland tram rail, which delivers sand to hoppers over coremakers benches and machines. Also shows method of handling cores on racks, which are put into the ovens by lift trucks. No sand is moved by hand from the time it arrives on the railroad siding in freight cars until it reaches the coremakers' bench. On the platform above, is a unit of the heating system by which warm air is forced down the heating ducts extending from the platform level to the floor, and delivered at the floor level. There is also an indirect heating and ventilating system in the walls

7—Cadillac method of "pouring off" the cylinders. Cylinder molds are all assembled and placed on roller conveyors. The man in the cab, with another man for skimming, performs the whole operation, replacing 21 men on a 3-hr. shift

Photographs by courtesy of the Cadillac Motor Car Co.





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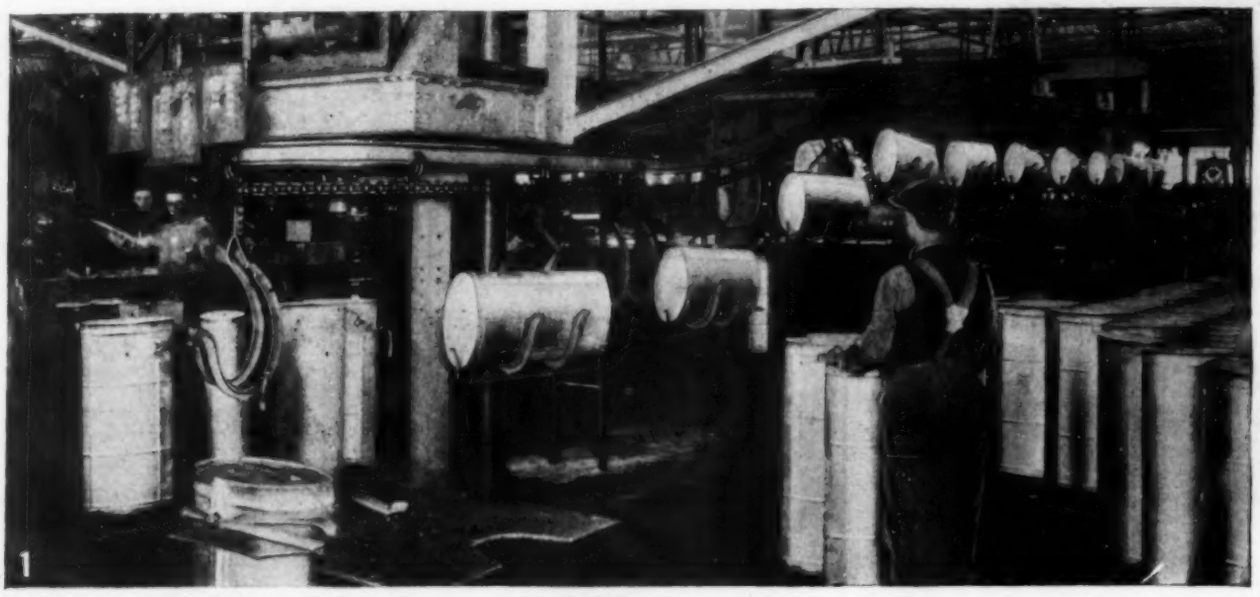
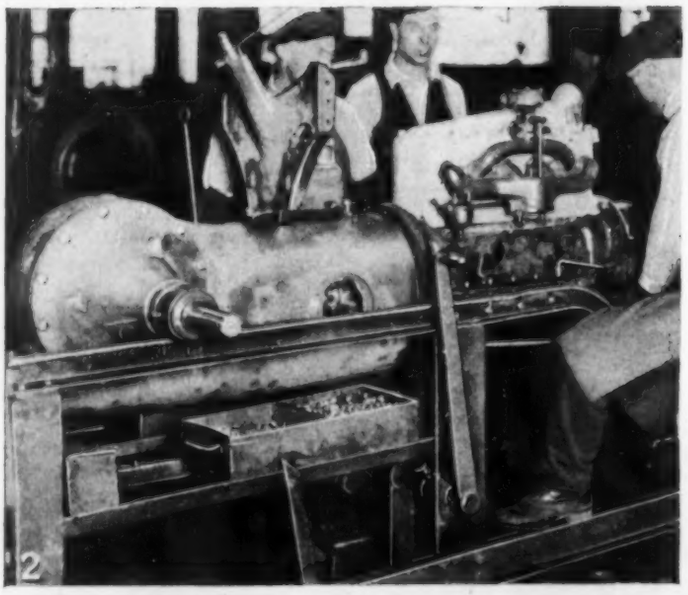




Assembling on the Move

Parts of the Fordson assembly line

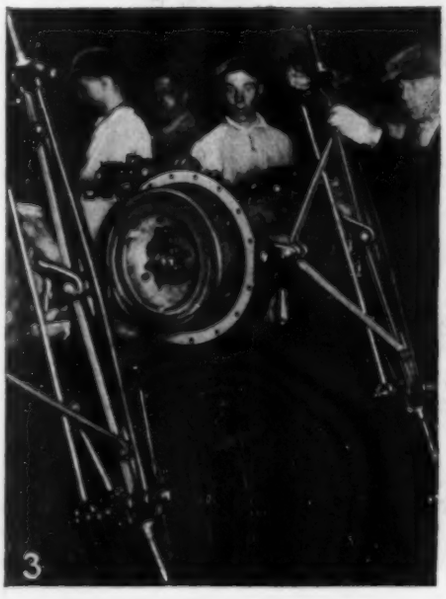
1—Bringing fuel tanks to the assembly line

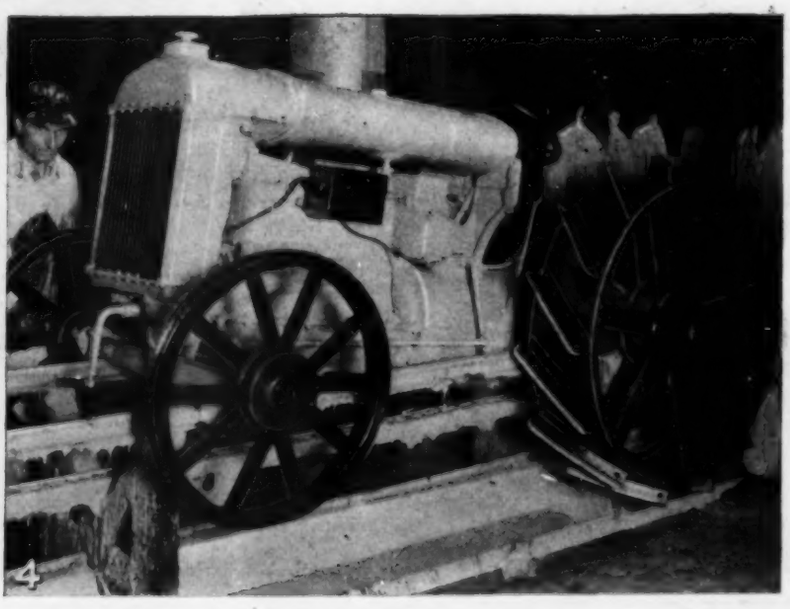
2—End of power- and transmission-unit assembly line

3—Attaching the front axles

4—Painted and ready to leave the line

Photographs by courtesy of the Ford Motor Co.





How Driving-Box Practice Varies

By Frank C. Hudson

Details of driving box design from a number of well known railroads, showing methods of applying hub and shoe and wedge liners

WHILE a chain is only as strong as its weakest link, there may be certain links that wear more and require renewal more frequently than others. In locomotive practice one of these links is composed of the driving box and the shoes and wedges that guide it in the pedestal jaws of the frame. These parts are subject to constant wear, and their repair or renewal forms one of the steady jobs in all railroad repair shops. With this in mind, we have made rather extensive inquiries as to the driving-box practices of the leading railroads, and the way in which they have responded with information and blueprints has been most gratifying.

The designs of driving boxes, crown brasses and shoes and wedges vary widely, even for locomotives of the same size and power. Some driving boxes have large recesses cast in the center of the crown brasses, these recesses in some cases being over 3 in. wide on a box for a 12-in. axle. The recess reduces the effective area of the bearing very materially, taking it from the top where it means a loss of 24 sq.in. or ⅓ of the projected area, out of a total of 144 square inches.

Narrower Recesses or None at All

Other roads use much narrower recesses, while a number of blueprints show no recesses or grooves, but apparently have ¼-in. or ⅜-in. oil holes leading from oil pockets on top of the boxes. Several roads use a somewhat different design of bearing in the main axle than on the others, in order to insure adequate lubrication to the first point where power is applied. One of the methods used is to have grease grooves cast that run from the outside toward the center, in the direction of rotation.

The practice regarding the use of wear plates on the sides of the boxes, also varies widely, as can be seen from the illustrations. Some do not apply wear plates until the locomotive comes in for repairs. A riveted wear plate is shown in Fig. 2. The great majority, however, seem to consider the wear plate as part of the driving box. Where this is not done, it is necessary to machine the side of the box to receive the wear plate when the locomotive comes into the shop, while by the other method, it is necessary only to take out the worn plate and put in a new one, by whatever method is employed. The extra cost of machining is very little when the new box is being made. In Fig. 3, both the hub liner and pedestal liners are cast in place.

A few roads are using an adjustable hub plate, while a special form of crown brass that can be removed and replaced without dropping the wheels, is finding favor in some quarters. One type of this kind of brass is shown in Fig. 4. The axle bearing is in three parts, each being renewable by jacking the weight from the axle. The hub wear-plate is held by patch bolts with babbitt over the heads. The growing realization that the fewer hours a locomotive is in the shop and the more it is on the road, the more it earns, is likely to force the use of more devices of this kind.

It will be noted that there is quite a difference of opinion as to the necessity, or advisability, of tapering the faces of the driving box that come against the pedestal shoe. Some leave a straight or flat spot in the center, from 1 to 2 in. in length. The former is shown in Fig. 7. The tapers used seem to vary from ¼ in. in 7 in. to ⅜ in. per foot, with a number using ½ in. per foot. One road, using the box shown in Fig. 1, uses a taper of ⅜ in. per foot. This illustration also shows the stud used to help hold the brass liner. It is a 1-in. patch bolt.

The wear plates also vary as to material, with brass predominating and babbitt second, although not very common. The wear plates are generally cast in place. In a few cases, however, they are riveted to the boxes. In several cases, oil holes are drilled from the oil pockets on top of the boxes to carry oil to the shoe and wedge surfaces.

Methods of Lining Boxes

The methods of lining the boxes to take the wear of shoes and wedges also vary widely. Diagonal dovetails are usually planed to receive the molten brass, and seem to hold very well. One well-known road drills a one-inch hole into the cellar, and preheats the driving box. The cast metal runs into the cellar and is riveted over to still further provide against coming loose, as in Fig. 5. This figure also shows a hole for a small crane hook, cast in the top of the brass to aid in handling, since the boxes are heavy.

A variation in the method for holding a brass or babbitt wear plate is shown in Fig. 5. Pieces of No. 11 B.W.G. galvanized wire netting are spot welded into the groove and the metal poured through and around the wire. This holds the metal much as a metal lath holds plaster.

Perhaps the most unusual wear plate is shown in Fig. 8. Here six studs are screwed into the wear-plate groove and between them are placed five brass inserts. Babbitt is then poured around the brass inserts and the studs, and presents a combination metal face to the driving wheel hub or hub plate.

One road used flangeless shoes and wedges, as shown in Fig. 6. Side plates are riveted to the pedestal jaws with ⅝-in. rivets in ⅞-in. holes. This practice eliminates breaking flanges of shoes and wedges, but transfers the wear from the shoes to the side plates and

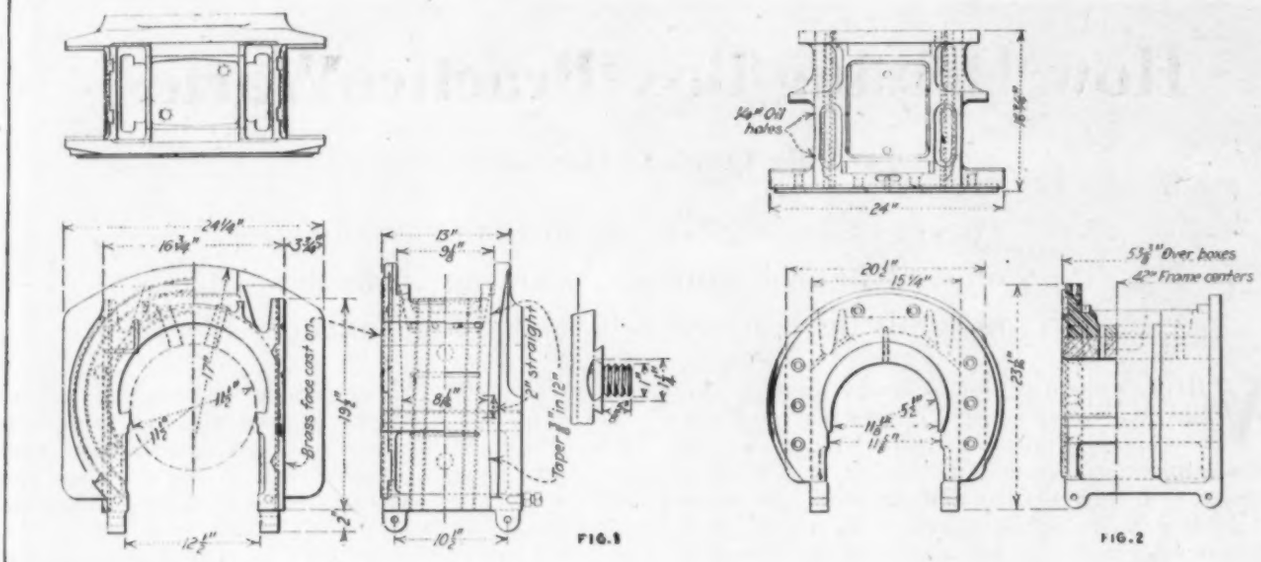


FIG. 1 FIG. 2

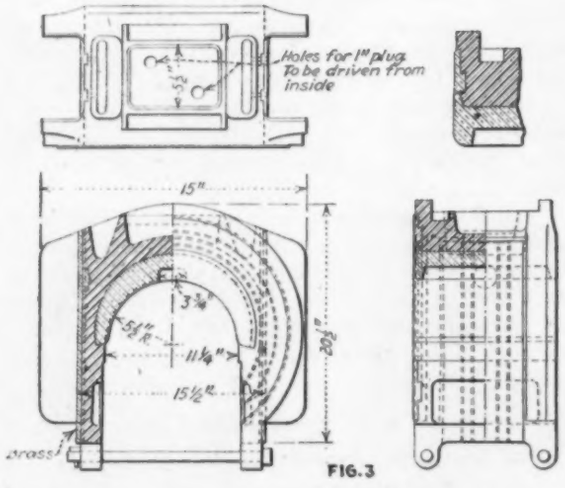


FIG. 3

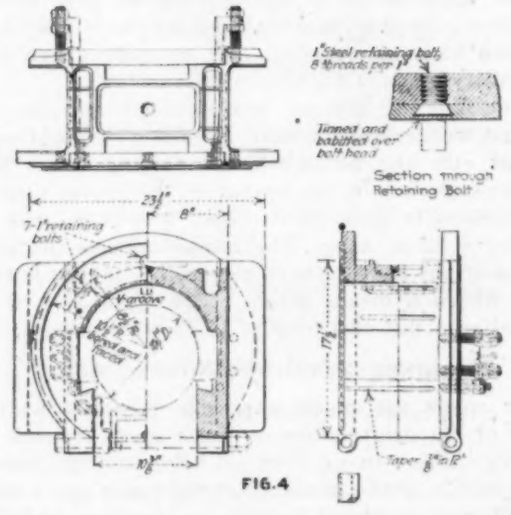


FIG. 4

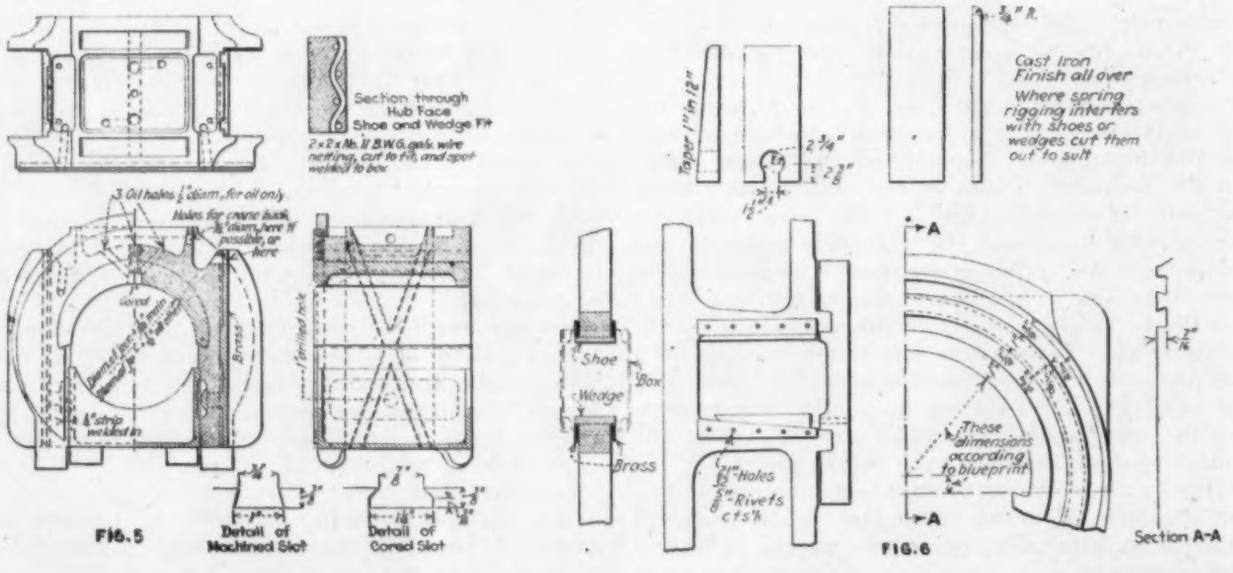

Section through Hub Face Shoe and Wedge Fit
2 x 2 x 1/4 in. 11 B.W.G. galv. wire netting, cut to fit, and spot welded to bar
3 Oil holes 1/4" diam., for oil only
Holes for coarse husk, 1/8" diam., here if possible, or here
Cored 1/4 main
Dowel pin
Brass
1/4" strip welded in
Drilled hole
Detail of Machined Slot
Detail of Cored Slot
Taper 1" in 12"
2 3/4"
2 3/8"
1 1/2"
3/16" R.
Cast Iron Finish all over
Where spring rigging interfers with shoes or wedges cut them out to suit
Shoe
Box
Wedge
Brass
1/2" Holes
5/8" Rivets c.t.s.k.
These dimensions according to blueprint
7/16
Section A-A

FIG. 5 FIG. 6

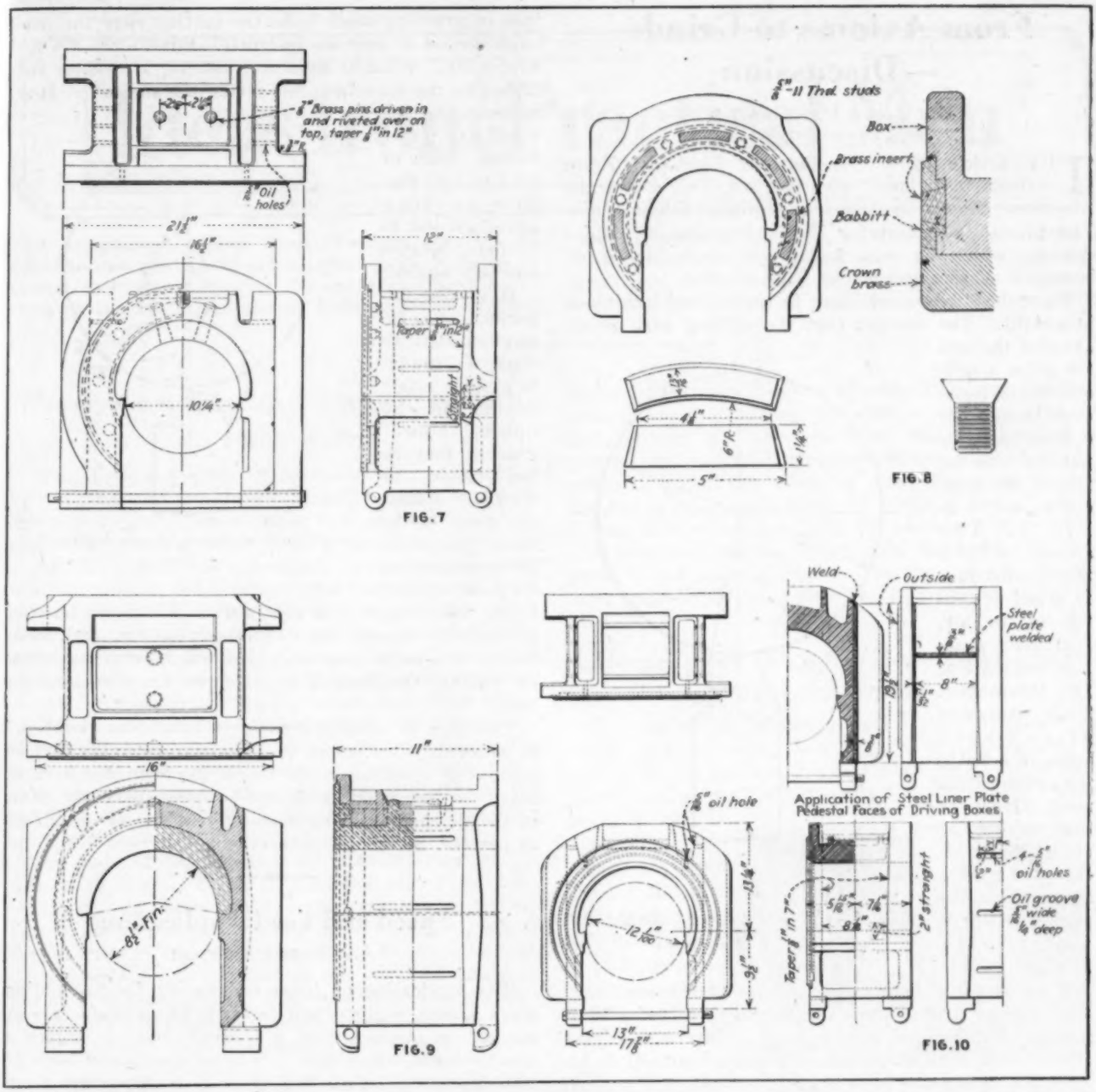


Fig. 1—Cone-head studs for holding wear plate. Fig. 2—No recess in top of crown brass. Oil holes to shoe and wedge. Fig. 3—Wide recess in top of crown brass—brass liner for shoe and wedge wear. Fig. 4—A crown brass that can be removed without dropping the wheels. Fig. 5—Unusual way of anchoring the brass liners for shoe and wedge wear. Fig. 6—Flangeless shoes and wedges; brass liners on sides of frame. Fig. 7—A simple driving box with taper flanges for shoes and wedges. Fig. 8—Side wear plates of babbitt with brass inserts. Fig. 9—Combined crown brass and wear plate poured in place. Fig. 10—Steel liner plates for pedestal faces of driving boxes

the driving boxes. This method makes it easy to machine the shoes and wedges in quantities. The detail at the right of Fig. 6 shows how the hub wear-plate is held with the double, dovetail grooves.

Changes in practice are noted in many cases. In some instances babbitt has given way to bronze for wear plates in driving boxes. In others, bronze shoes and wedges have been replaced by cast iron, both being very natural changes. In one case, a more expensive material is used and in the second case this is reversed, but in both instances the miles-per-dollar wear is likely to be increased.

In Fig. 9 is a crown brass and wear plate cast into the driving box in one piece. The road using this particular combination reports good results. The method of holding the wear plate is a combination of dovetail grooves and anchoring studs, cast into holes drilled into the box itself. In addition, there are integral, cast studs or rivets that flow through the top of the box and are riveted over at the top.

In Fig. 10 is a method that differs from all the rest Here a steel liner, in the shape of a plate ½ in. thick, is welded to the sides of the steel driving box as shown. It is welded at the ends and also down the sides between the flanges of the driving box. The hub wear plate is of brass, cast into the dovetail groove shown.

From Axioms to Grinds —Discussion

By Ralph E. Flanders
Jones & Lamson Machine Co.

THE article by C. W. Bettcher entitled, "From Axioms to Grinds," on page 229, Vol. 63, of the *American Machinist*, is an exceedingly valuable one. The principles underlying the sharpening of thread chasers, which he sets forth, are applicable to all makes of chasers and are of wide interest.

There is but one criticism to make that I think is important. The amount that the cutting edge is set ahead of the center gives a definite initial hook, even though the cutting edge is parallel with the face of the chasers as shown in Fig. 1. The amount which the parallel face is ahead of center is, in Mr. Bettcher's practice, one-tenth of the diameter. This distance gives a hook when referred to the radius a little more than 11 deg., so that the actual effect on the work of a chaser ground as shown in Fig. 2 would be to give 21-deg., 26-deg. and minus 4-deg. hook to the cutting edge respectively.

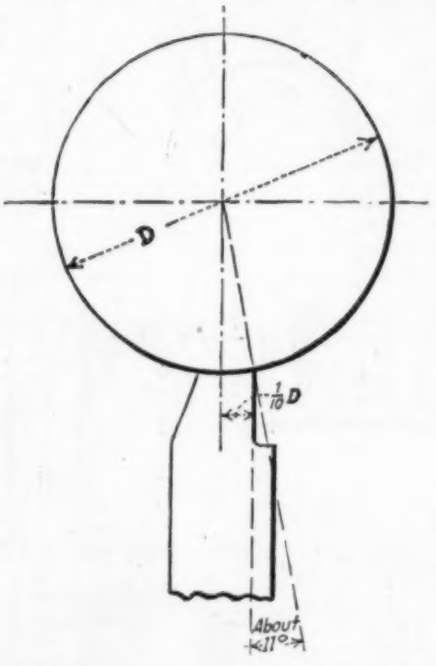


Fig. 1—Cutting edge of chaser set ahead of center

It may at first confuse the workman to refer these angles to the radial line instead of the face of the chaser; but he is at present still more confused in his attempts to measure hook angles from the face without reference to the height of the cutting edge above

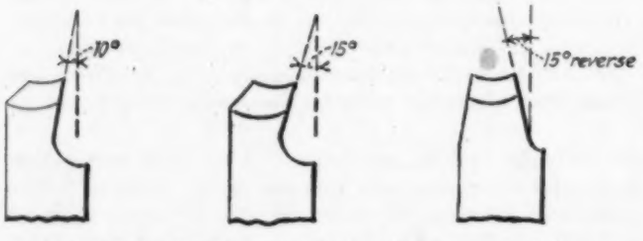


Fig. 2—Hook angles for various materials

center. The difficulty enters into any attempt to reproduce the cutting conditions of a set of chasers of one make when using those of another, or into the attempt to retain the same cutting conditions on a set of chasers that have the cutting edge ground back nearer the center of the work. This point is shown in Fig. 3 (Fig. 5 in the original article), where we are told that in grinding stock from the cutting edge the hook angle should be increased slightly. But we are not told how much. What is needed, I believe, are tables furnished by the manufacturer, giving the amount of hook, measured by the radius, for various sizes of chasers that have cutting edges ground to various heights and face angles.

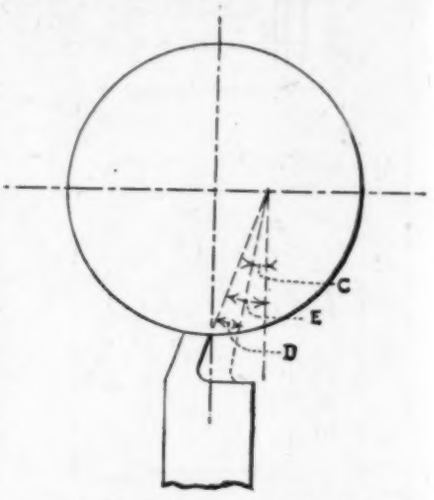


Fig. 3—Chaser ground ahead of center

It is also important to remember that all chasers cannot be ground safely on the top. So called "milled" chasers that do not follow, or nearly follow, the circle of the work cannot be ground much on top without losing their bearing on the work. When the bearing is lost the chasers have no lead control, and leads longer or shorter than standard will be cut depending on whether the diehead is forced on the work or held back.

The type of chasers commonly known as "hobbed," or those that are lapped to a bearing, permit a certain amount of grinding on the top of the teeth, but even in this case the grinding should be done sparingly, most of the sharpening being done by grinding at the throat as per Mr. Bettcher's instructions.

Speed and Feed Applications

By George Feltner

The application of feeds and speeds for production work is such an important factor in the manufacture of mechanical products that it generally pays to employ a practical man whose duty it is to set speeds and feeds of machinery and to see that there is no departure from them after they are once found satisfactory. The shop that is progressive will realize the importance of the subject of metal cutting and endeavor to increase the operating efficiency by applying proper speeds and feeds.

In one of the larger production shops where an efficiency man is continually busy studying cutting speeds and feeds and the operation of cutting tools and making changes as are found advantageous, there was a yearly saving of more than five times his salary. The savings included an increase in production, a reduction of machine repair, a smaller amount of cutting tools required for a given amount of work and an insurance of longer machine-tool life.

The man placed on such important work as speeds and feeds of machinery should be a thorough mechanic and understand well the general principles of metal cutting. Such a man is as important as the foreman and should be paid accordingly. A record of all changes made, tabulated on a printed form, will soon show the value of speeds and feeds and the savings to be effected.

Ideas from Practical Men

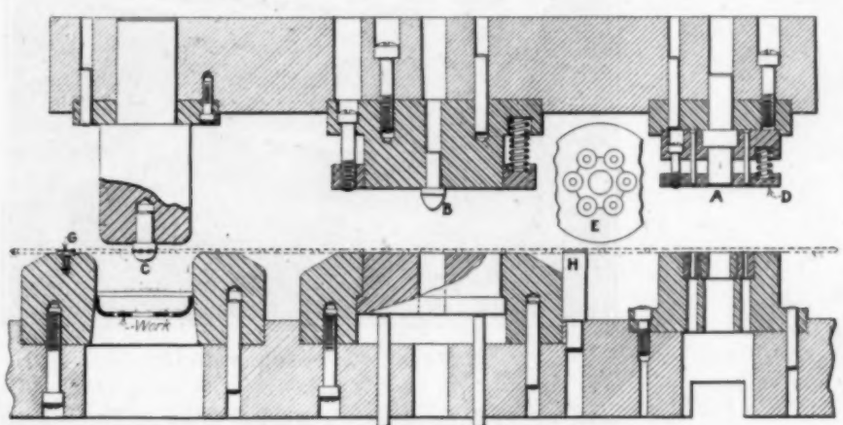
The department, "Ideas from Practical Men," is devoted to the exchange of information on methods useful to the machinery industries. Its scope includes all divisions of the machine building industry, from drafting room to shipping platform. Descriptions of methods or devices that have proved their value are carefully considered, and those published are paid for. The rates are from five dollars upward, according to their merit

Progressive Die for a Sheet-Metal Cup

By Frank Waldo

Press tools can often be combined into one unit, so that production may be increased correspondingly through the reduction of labor cost, and the use of an additional machine is sometimes made available by such a combination. This statement seems justified after visiting several shops where considerable press work is handled, since a close observation showed that many of the operations did not fully occupy the machine in which they were performed. On the other hand some plants have used every effort to increase the efficiency of their press work, with the result that some of the tools used are far above the ordinary. The die shown in the illustration is rather unique, in that it performs three operations—piercing, blanking and drawing, that were formerly done in three separate dies. While the die is of the four-pillar type, only the actual working units are shown.

The material worked is $\frac{1}{16}$-in. drawing steel and is formed to a shell, 2 in. in diameter and $\frac{3}{4}$ in. deep, having a $\frac{1}{2}$-in. hole in the center surrounded by six $\frac{1}{8}$-in. holes located on a radius of $\frac{7}{16}$ in. The stock is first pierced by the unit at *A*, which is provided with the pressure pad *D* for holding the work. A layout of the holes is shown at *E*. The punchings pass through the die and are removed through a hole in the die-shoe by air pressure. The next station that blanks the stock



Sectional view of three-step progressive die

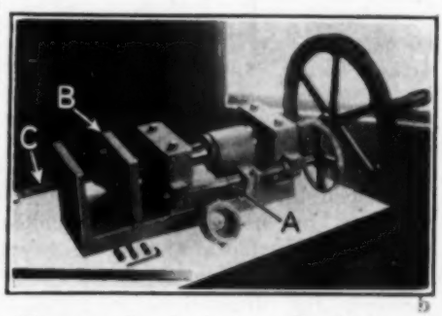
is so positioned that a pierced portion is left between it and the piercing unit. The compound die *B* is used for blanking, and is so made that the blank is forced back into the stock and carried on with it to the final die *C* that, in turn, pushes out the blank and forms it to shape. Pilots are used in the blanking and drawing tools to aid in centering the work which is located by the stop pin *G*. The pin *H* is used for locating a pierced part so that the part previously pierced will be centered under the blanking die. The stock is fed through a roller-feed oiler, by which a film of oil is deposited on each side, giving the necessary lubrication.

A combined unit can be arranged for making similar parts in one operation but in the piece shown, the six small holes would make the upkeep somewhat high.

A Home-Made Device to Bore Ford Timers

By Milton Wright

The illustration shows a device that was built in an automobile repair shop where the equipment is limited to one lathe and a few hand tools, but where, as is usual in such shops, almost any ordinary repair upon a car is cheerfully undertaken. The job for which it was designed is the boring of the bakelite ring, with the metal insets, that constitutes the business end of a Ford timer.



Home-made rig to bore Ford timers

A wood pattern was made (in the shop) from which to cast the base, and the smaller parts were "picked up" in the usual manner from any old machine part that came handy. The boring bar is a piece of cold-rolled shaft with a cross-hole drifted near one end to hold the toolbits, which are fastened in the bar by a hollow-head setscrew.

The cutter is fed to the work by the screw *A*, which lies parallel to the bar and is driven by it through the gear and pinion at a 3 to 1 reduction in speed. The pinion is enough longer than the gear to allow for the necessary traverse of the bar. The master-thread is of 30 pitch, giving a feed ratio of approximately 0.011 in. per revolution of the bar.

IDEAS FROM PRACTICAL MEN

A split nut, attached to a yoke that is confined between collars on the bar, provides the means of transmitting the feed movement. The work is held against the face of the upright at *B* by the long screw *C*, and all the setup that is required is to place the timer in position over the hole in upright *B* and tighten the screw. Five minutes is ample time to complete the job.

Toolmakers' Sine-Bar and Adjustable Angle Plate

By H. L. Wheeler

The sine-bar set shown in Fig. 1 is designed to go inside the toolmakers' kit and will occupy little space. The cast-iron block, being hollow, is light in weight. The bar is light also, since it has holes drilled along its entire length. The block is provided with a series of tapped holes for securing the bar in any desired position, by using one fillister-head screw and a washer. The block should be carefully planed, and finished by grinding all over. If desired, the dimensions may be altered to suit the particular fancy of the user, although the bar should not be less than the prescribed 5 in. in length. The bar is of tool steel, hardened and ground all over. In use, it may be set by size blocks as shown, or by an indicator. The blocks may be used either in a horizontal or vertical position, to meet any condition of setting required, or to get practically any angle. The accuracy of this set depends, of course, upon the care and precision used in making it.

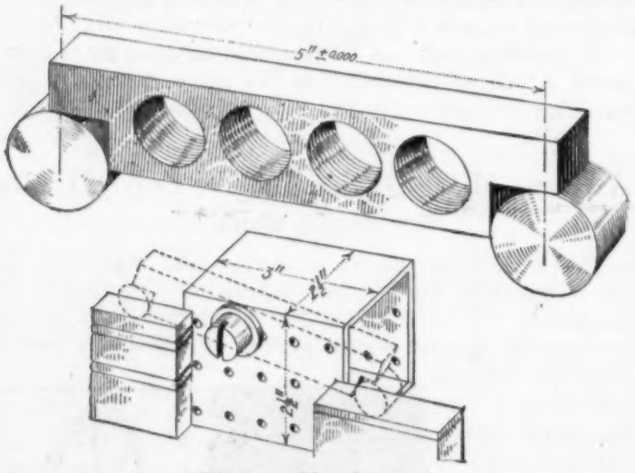


Fig. 1—Sine-bar set

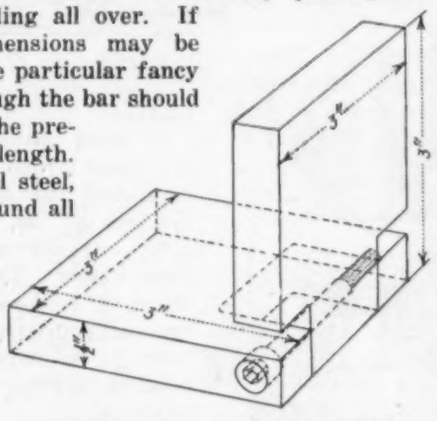


Fig. 2—Adjustable angle plate

In Fig. 2 is shown a toolmaker's adjustable angle plate, which is a mighty handy tool for use on a surface grinder, in conjunction with the magnetic chuck. The angle may be set by transferring it from a sine-bar by a bevel protractor. The single screw is sufficient to lock the plate in position, since it should not be used for heavy work. The work may be fastened with clamps, or if desired, the plate can be made with drilled holes for small bolts and clamps. The joints should be carefully made and fitted, and the plates should be ground all over. Either cast iron or steel may be used for making it.

These two tools make a fine combination for the toolmaker who has a lot of fussy angle work to do.

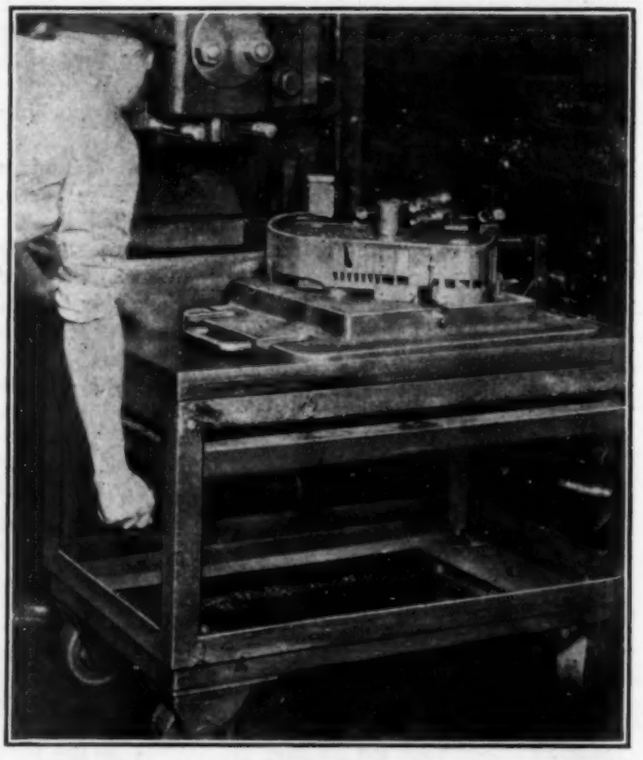
A Die Guard and a Truck

By Charles F. Henry

The Western Electric Co., Hawthorne, Ill., does large amounts of press work. As a result, it has developed a great many useful methods and devices, two of which are illustrated herewith, in one view.

The first is the set of press tools having the guard built around them so as to effectually prevent accident to the operator, the work having a continuous feed through the die.

The tools are resting on a special truck for handling heavy dies from the tool storage to the presses. It is built of steel angles with welded joints. The wheels at one end swivel, but instead of being independent they are tied together the same as in motor vehicles, so as to insure better control. In addition, the truck top or table can be raised or lowered so as to bring it to the same height as the bed of the press. In this way the tools can be slid on to the press without lifting.



Truck for handling dies

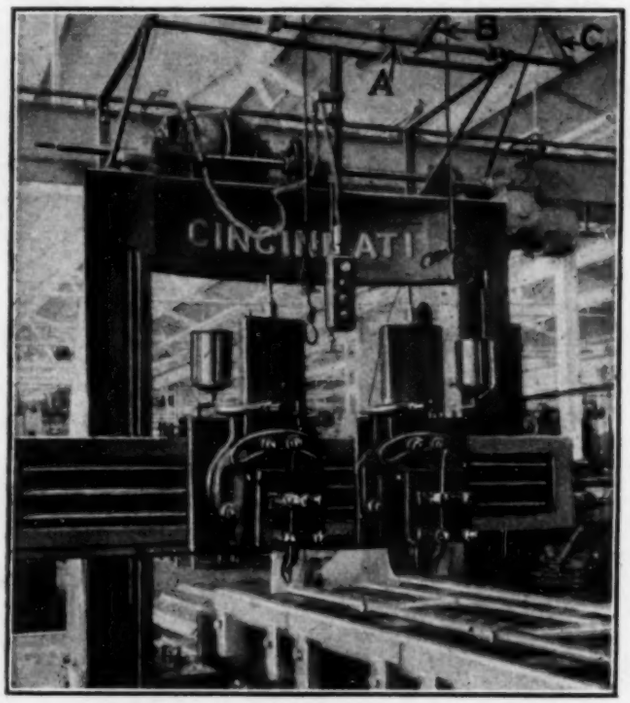
IDEAS FROM PRACTICAL MEN

An Automatic Tool Lifter

BY I. B. RICH

One of the bright mechanics in the shop of the Kelly Press division of the American Type Founders Co., Elizabeth, N. J., has devised an automatic tool lifter for use on one of the Cincinnati planers as shown in the illustration.

A light framework is built over the planer to carry the shaft *A*, to which is fastened two arms, one for each tool block, as at *B*. At the end of the shaft is



Automatic tool lifter for planer

another arm, *C*, connected by a link to the reversing mechanism of the planer. From the arms *B*, cords lead to one of the clamp screws on each clapper. As reversal takes place, the shaft *A* is partially rotated, moving the arms *B*. By this means the tools are lifted as soon as the planer reverses, without attention on the part of the operator.

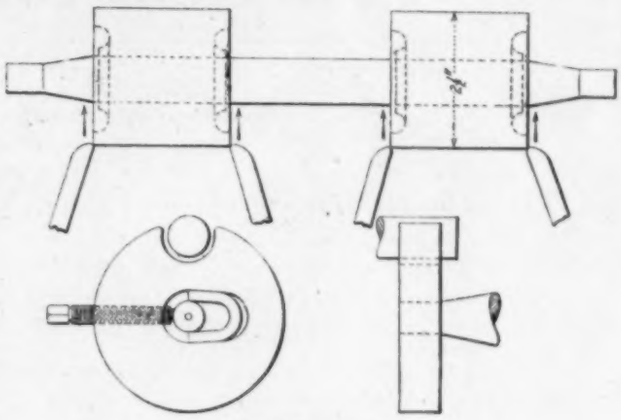
A Super-Power Dog

BY JOHN C. TONKIN

The four ends of the rolls shown at *A* were to be faced and gaged to the right width at a single finishing cut. The mandrel was pack hardened and polished and was so hard to hold that it was difficult to face even one end of a roll at one cut.

To help us out of our difficulty, we made the dog shown at *B* from a disk of tool steel. There were soft steel shoes, ⅛ in. thick, under the point of the screw, and between the work and the wedge-shaped sides of the hole. The dog was driven by a stud on the faceplate which engaged the notch in the side.

The stellite tools used, were fitted to clamp in slots



A dog that will not slip

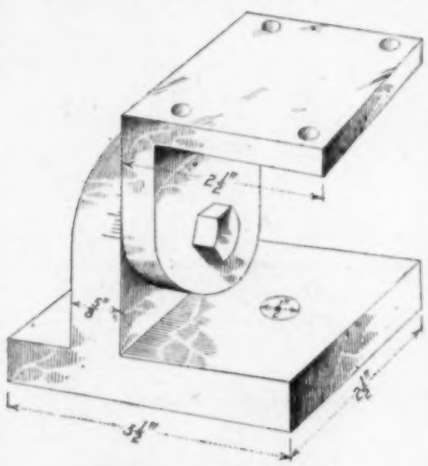
in a block bolted to the toolblock of the lathe. This block had a sliding blade which gaged the proper distance for the facing cuts from the right-hand end of the mandrel.

Adjustable Angle Plate for Toolmaker's Use

BY A. ELLSWORTH

The accompanying drawing shows a handy angle plate intended for use on a surface grinding machine in conjunction with a magnetic chuck. It may be made of cast iron, and should be ground all over.

The circular edge of the upwardly projecting angle of the lower member is graduated in degrees to facilitate setting the plate roughly when angles are to be ground upon the work. If such angles demand more than ordinary accuracy the graduations may be disregarded and the setting accomplished with the aid of a sine-bar. The upper member is supported in position on the lower member by a closely fitting stud, about which it may be tilted to any desired angle up to 90 deg. in either direction. A nut upon the stud provides means for clamping the upper member in any setting.



Adjustable angle plate

The top surface of the upper member is provided with holes for push-pins, the holes being located accurately so that the pins may be depended upon when setting work that is to be ground square.

Such a tool will be found useful on many small jobs of surface grinding.

Practical Shop Problems

Questions of a Practical Nature will be answered in these columns

The Jackscrew Problem

Q. A vertical screw actuates a nut to raise or lower a load. The threads on the screw are 6 pitch. The screw is rotated through a pair of bevel gears by a crank arm on the end of a horizontal shaft. The bevel gears are in the ratio of 3 to 1, the larger being on the screw. The crank arm is 7 in. in length from the center of its shaft to the center of the crank handle.

When a pressure of 20 lb. is exerted at the crank handle to rotate the screw, please tell us what pressure the nut is capable of exerting in a line parallel to the screw.

A. Neglecting friction, the energy put in at the crank handle will be equal to the energy that can be taken out. Translating this energy into its component parts, the force exerted at the handle multiplied by the distance through which the handle is moved is equal to the force exerted at the nut multiplied by the corresponding distance through which the nut is moved.

For the purposes of the problem any distance can be assumed for the travel of either the nut or the handle and the corresponding distance determined for the other, for, in the solution, these distances cancel out. Assume the nut is moved one inch.

Then the screw will have revolved 6 times due to the thread pitch, and the lever arm will have made 3×6 or 18 complete revolutions due to the bevel-gear ratio between the screw and the lever arm. Expressed in inches of travel, 18 revolutions of the lever arm are equivalent to $18 \times \pi \times 7 \times 2$, considering the 7-in. length of the arm, or 791 inches.

These values can then be put into an equation with P the pressure at the nut. $P \times 1 = 20 \times 791$ or $P = \frac{20 \times 791}{1} = 15{,}820$ pounds.

In other words, when 20 lb. is required at the lever-arm handle to move it there will be a resistance to motion at the nut of 15,820 lb. neglecting friction which will effect the theoretical figure.

Removing Scale Before Welding

Q. We have a welding operation in a seam-welder between two pieces of 18-gage steel in which we are having considerable difficulty on account of scale. The material is box-annealed. If there is any scale, the joint will not pass inspection. At present we are grinding the pieces for the whole length of the seam, which is lapped approximately one-quarter of an inch, on both sides. It is a costly operation. Can you suggest any better way of removing the scale without pickling the whole sheet.

A. There is a way of removing the scale rapidly and to advantage on work similar to yours, and if the building of a special but rather simple machine would not be a deterrant, we believe the method would overcome your difficulties.

It involves passing the surface to be cleaned under wire-brush wheels, which are made of a special wire and are revolved at a speed sufficiently high to cause a striking rather than a wiping action. The special machine is required to mount the wheels.

Scale can be removed on a comparatively narrow path with great rapidity and a beautiful surface left for welding. If you are interested, we shall be glad to put you in touch with the wheel manufacturers who are in position to supply the wheels and who can advise you on the machine installation.

Magnalium

Q. I understand there is an alloy which is considerably lighter in weight than aluminum and of decided unit strength. Please tell me the name of this metal, its physical characteristics, and by whom it is made.

A. The metal to which you refer may be magnalium. It contains in its various forms from 2 to 23 per cent of magnesium and the balance of aluminum.

Its specific gravity varies between 2.40 and 2.57. Its melting point is from 1,110 to 1,290 deg. F. The tensile strength, cast in chills, is from 42,000 to 64,000 lb. per sq.in.; when sand cast, it shows 17,000 to 30,000 lb. per sq.in.; when rolled, 28,000 to 35,000 lb. per sq.in., and when stamped, from 52,000 to 70,000 lb. per sq.in. It will not tarnish.

It is made by the American Magnesium Corporation, Niagara Falls, N. Y.

Cause and Prevention of Spots on Oil-Hardened Tools

Q. Please tell me the cause and inform me of preventive measures for a blotched and spotted condition on oil-hardened steel dies which requires a great deal of stoning and rubbing to clean off. The steel comes clean from the furnace.

A. We think you can find the cause of your trouble in the quenching oil. The spots are doubtless carbon.

Oil that has been used for a length of time without changing or cleaning will contain carbon that will stick to the parts when they are immersed. Or if the oil is allowed to heat up unduly, the carbon contained in the oil itself will be released and deposited on the steel surfaces.

To correct this condition, the oil can be filtered or cleaned by other suitable methods. The only way to avoid overheating is not to use a given quantity faster than it can radiate the heat, a matter of amount with relation to the work to be done.

Kerosene can be used to advantage to clean the carbon deposit from the surfaces of the hardened dies.

Punch here to suit your binder

Characteristics of Stellite

Milling Cutters

STELLITE cutters are made both in the solid and inserted-blade types. The solid cutters are made by casting the cutting portion on steel cores. The teeth of such cutters are generally ground with less clearance than are other forms of cutters and the speed is increased to suit the material being cut. The feed per tooth is usually the same although the feed per minute is increased due to the higher speed that is made possible. The materials that may be machined with stellite cutters are the same as mentioned for turning tools.

Inserted-tooth cutter blades made of stellite have found a prominent place in shops where production milling is handled. The blades are cast solid and may be used in the average type of cutter body. The rake angle of the blades should be between 0 and 10 deg. for milling cast metals, as shown at *A* and *B* in Fig. 3. When the angle is increased to 15 or 20 deg. as shown at *C* there is not sufficient strength back of the cutting edge, generally causing a rough finish, loss of durability and an increase in the number of grindings required. A correct type of grind for inserted-blade milling cutters is shown in the three views *D*. Cutters ground to these angles have been found to offer excellent results.

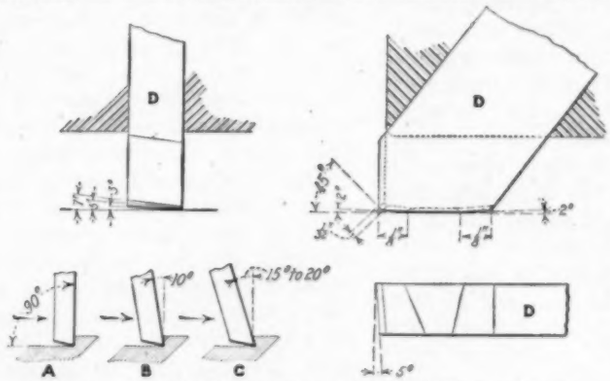


Fig. 3—Grind for inserted-blade milling cutters

Inspecting Cutters

In order to insure a properly ground inserted-blade cutter so as to reduce the amount of time that is required for grinding, handling and changing dull cutters, the following suggestions should be followed: Have each blade a tight fit in the milling-cutter body; keep the spindle of the grinding machine in good condition and free from end play; see that the grinding fixtures are in good condition; use the correct grade of abrasive so as to produce a smooth, true, sharp cutting edge and avoid checking of the blades; keep the abrasive wheel properly dressed and inspect the finish-ground cutter for accuracy. The inspection can be made by using a fixture equipped with a dial indicator, arranged so that the heights of the cutting faces and the outer edges of each blade can be checked. Cutters that are permitted to go direct from the cutter grinder to the milling machine without inspection are likely to have a few high teeth that will take the largest part of the cut and, likewise, dull rapidly and cause a rough finish of the work.

If a cutter of correct design is properly ground and operating at correct feed and speed and still fails to operate efficiently, the cause can often be traced to incorrect machine adjustments. The following adjustments should be inspected: Alignment of spindle; adjustment and fitting of bearings and thrust collars; lost motion and back-lash of gears; adjustments of machine table and other parts where lost motion is likely to cause chatter or play.

Speeds and Feeds

The speeds and feeds for use with stellite tools cannot be specified, because the nature of the material to be machined, the type of machine tool used and the shape of the cutting tool are the governing factors. If the machine tool is modern and the tool correctly ground it is possible to increase the speed of the work or cutter about 20 per cent over the speed used for tool steels. If this increase gives a satisfactory life of the tool it is possible to slowly increase the speed or feed per revolution until a maximum point has been reached, this, of course, being determined by the finish of the work obtained and the life of the cutting edge of the tool. For milling cutters of the inserted-blade type, records show that a good peripheral speed for roughing cast iron on a line-type milling machine is 100 ft. per min., and on a rotary or drum-type machine 120 ft. per min. Finishing cutters can run between 150 to 170 ft. per min. For finishing work of this kind in one cut on a line-type machine the cutters should run 125 ft. per min., while on a rotary machine the speed may be as high as 150 feet.

The usual table travel for an inserted-blade milling cutters is from 0.01 to 0.015 in. per tooth, although on some materials with favorable conditions a feed of 0.03 in. per tooth has been employed. The table travel varies in most cases as the nature of the work and the design of the fixture are not always able to withstand a great amount of pressure without springing out of shape. As these points are the deciding factors in establishing table travel, it is impossible to give a definite rate of travel that should be followed.

Important Points

Important admonitions in regard to the application of stellite are: Be sure that the tool has a solid support; do not have excessive overhang of the cutting edge; do not clamp tools down on a worn surface; do not use a pointed set screw for clamping; do not use a lubricant unless the point of the tool is kept hot while cutting in spite of the lubricant; do not plunge a tool into water while grinding, because it is likely to cause checking; do not try to forge or temper tools; do not grind lip or back slope on tools; and be sure to grind tools as outlined in order to get the best results.

For the data given we are indebted to the manufacturer.

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Trim Line

Technical Abstracts

Power Transmission

Wm. Staniar, belting and transmission engineer of the E. I. du Pont de Nemours & Co. and for some of the General Motors companies states that to find out whether you can save money on your belt transmission, ask yourself these questions: First, what is our annual expenditure for new belting; second, what is our annual belting maintenance cost; third, how many belt repair men do we employ; fourth, who prescribes the belting we buy—the purchasing department or an experienced engineer; fifth, who determines the particular belt as to type, width and thickness for the particular drive—millwrights or an experienced engineer; sixth, have we any system for belting control, or is it just a hit or miss proposition; seventh, what types of belting are we using and why; eighth, do we really know anything about the leather belting we are buying; ninth, do we buy leather belting on specification, if so, are our purchases checked and by whom; tenth, what controls our leather belting purchases — quality or discount; eleventh, have we investigated the possibility of using rubber, hair, balata or canvas belting for some installations; twelfth, do we pay any particular attention to the methods of joining our belting?

The system which Mr. Staniar has in operation is a practicable and simple method for using the right belt in the right place as to type, width and thickness and is based on a detail study of certain facts. His system, owing to its simplicity, has shown substantial savings annually for the plants using it, because each installation is based on scientific investigation and not left to guesswork. The purchasing divisions of corporations should not prescribe the types, brands and sizes of belting to be used. This is the function of the mechanical section because purchasing agents have not the time to investigate the actual plant conditions under which the belting is called upon to operate, and price and discount are too often the absorbing factors. First cost is nothing when compared with the advantages to be gained by buying the correct type for the installation as the conditions and the peak load tell the story.—*Industry Illustrated*, Sept., 1925, p. 12.

Permanent Molds for Cast Iron

Probably one of the principle causes of the slow development of the application of permanent metal molds to the production of cast iron is the initial expense of producing the molds. The designing of metal molds for the production of castings of any great degree of intricacy is a matter of much skill. Considerable ingenuity has made it possible to utilize metal cores in the permanent-mold casting of certain non-ferrous alloys. So far as the author of this article is aware, no really satisfactory use of metal cores has been made in the case of cast iron, and sand cores are almost invariably used where permanent molds have been adopted.

Cast iron is different from other commercial metals and alloys, in that the chilled variety or the rapidly cooled variety is a hard brittle, unmachinable material, as distinct from the soft grey machinable character of the same material when slowly cooled. Herein lies the principal difficulty in the production of iron castings from metal molds. The use of metal molds generally involves the subjection of the material to rates of cooling which bring about the formation of the chilled variety of cast iron, making the castings unsuitable, without further treatment, for most industrial purposes.

The prevention of the formation of chill in castings may be accomplished by the use of warm molds and another method is the subjection of the casting to the annealing treatment subsequent to the casting operation. White iron, containing silicon in normal foundry quantities, when heated for a short time to certain temperatures is rapidly converted into soft grey iron. The only drawback to the method is the addition to the cost of production of the castings. From other points of view it has distinct advantages. Even in castings produced from permanent metal molds initially free from chill a considerable improvement in the mechanical properties is brought about by the annealing treatment.

One method used in America is the coating of the internal surface with a thin layer of refractory material. This is the system used by the Holley Carburetor Co., Detroit, Mich. This coating of some refractory body is applied in the form of successive coatings and the finished mold is coated with a carbon deposit from an acetylene flame.—*The Engineer* (England). Sept. 25, p. 327.

The Tool Crib

Continuing his series of articles on the tool crib, Anker L. Christensen, of the Worthington Pump and Machinery Corporation, states that the tools which should be under the supervision of the tool crib foreman might be divided into four classes: first, tools used on more than one machine or by more than one workman—these tools should be kept in the tool crib; second, tools that are part of the equipment of one machine—these tools should be inventoried as part of the equipment of the machine to which they belong and should be filed in regular cabinets adjacent to the machine; third, tools that are used continually by one workman only—A record of this class should be kept on the regular tool inventory and should be charged to the workmen on special forms; finally, the tools that are everybody's and nobody's—tools such as wheelbarrows, shop trucks, and stepladders. A definite place should be assigned in which each tool is to be kept when not in actual use.

Mr. Christensen says that the tool crib foreman has one of the hardest jobs in the whole plant. His duties are varied and include the responsibility for issuing tools and entering purchase requisitions.—*Management and Administration*, Sept. 1925, p. 141.

American Machinist

Established 1877

KENNETH H. CONDIT AND FRED H. COLVIN, *Editors*

Wanted—A Research Engineer

A RECENT classified advertisement in the "American Machinist" under the above heading is a most encouraging sign of the times. It brings to mind the fact that two, at least, of the better known machine tool building companies have recently embarked on rather comprehensive research programs. The directing heads of these enterprises are wise enough to realize the limitations of their own knowledge and are taking steps to increase it.

The immensely profitable results attainable through research have been amply demonstrated by such organizations as the General Electric Company, the Eastman Kodak Company and the American Telephone and Telegraph Company. No machine tool builder has resources that compare with those of the companies mentioned but at least he can learn much to his own profit by such research as his business will support.

Attracting Men to the Metal Working Industries

THE almost universal complaint from metal working industries that good men are hard to get ought to receive more thought and study than seems to be the case. It is a serious menace that demands careful consideration.

There seems to be little doubt that the changing conditions of the past decade have made the metal working industry seem less desirable than others to the kind of men which the industry needs. No matter how much we may believe that men are foolish in choosing other fields, the fact remains that they do and no amount of scolding is going to change the situation. The only solution is to study the case carefully, learn the reasons and find a remedy.

Having found the remedy we must make the young men see the advantages of the metal working industry. Mere advertising statements in glowing language will not answer. Good and sound reasons for working in the metal trades must be given and proved. There must be no camouflaging but plain statements of facts. Men have been overfed on propaganda and are very keen at detecting it under various guises.

Among the conditions which men consider and criticise are those of wages, hours, working conditions, safety and opportunities of advancement. They do not see the advantages of serving a long apprenticeship to become skilled in various branches only to receive less money than a piece-worker with no special training. They do not understand why a bricklayer whose work requires far less skill than a good machinist, gets double his wages or more. The answer of steady employment does not satisfy as the bricklayer could earn as much per year by working half-time.

This question of attracting desirable men to the metal working industry is a real problem. The sooner it is given careful consideration the quicker will we find the answer. It is a problem which must be approached without prejudice and with an open mind.

Reprinted by request from Vol. 59, No. 16, p. 604

Get Used to the Idea of Air Transport

REGULARITY and punctuality may be said to be the two cardinal principles of commercial transportation. The greater these two factors the more any mode of transport becomes a success.

Both railway and steamship travel have become almost independent of weather conditions and motor transport is not far behind. But with all three methods, fog, snow and wind are still conditions to be reckoned with.

Air transport is rapidly approaching the same reliability as the older methods. In fact, the air mail has set a record that the railroads find it almost impossible to equal. Commercial aviation, however, has not yet reached the stage of regularity that attracts business. It has been a case where without business there could be no regularity and without regularity there was no business.

Several attempts to fly on schedule have been made by various pioneers, but no one has seemed to have the right combination of vision, capital and facilities to carry schedules over a sufficient period to insure a regular business.

It is for this reason that the entry of the Ford interests in aviation, which includes a thoroughly practical airport organization, together with capital and vision, promises to put the United States on the map in commercial aviation. Carrying only Ford material, two planes are in regular operation between Detroit and Chicago and Detroit and Cleveland. They depart exactly on time with the regularity of the fastest railway trains and are affording an excellent opportunity to study costs of operation.

This service is to be increased and there is every reason to believe that we shall show a steady growth of air transport as a result of the Ford efforts. In the meantime it will be well for all business men to begin to think of air transport as a part of their business methods the same as they do of the long distance telephone and the telegraph.

Shop Equipment News

Niles-Bement-Pond "Timesaver" Planers

The line of "Timesaver" planers is being built in three sizes, 36 in., 42 in., and 48 in., by the Niles-Bement-Pond Co., 111 Broadway, New York, N. Y. The design includes features intended to make operation easy, to simplify and centralize control, to make the working parts accessible and to protect the machine against damage from careless handling. Construction for ruggedness and accuracy follows the company's past practice and needs no detailed description.

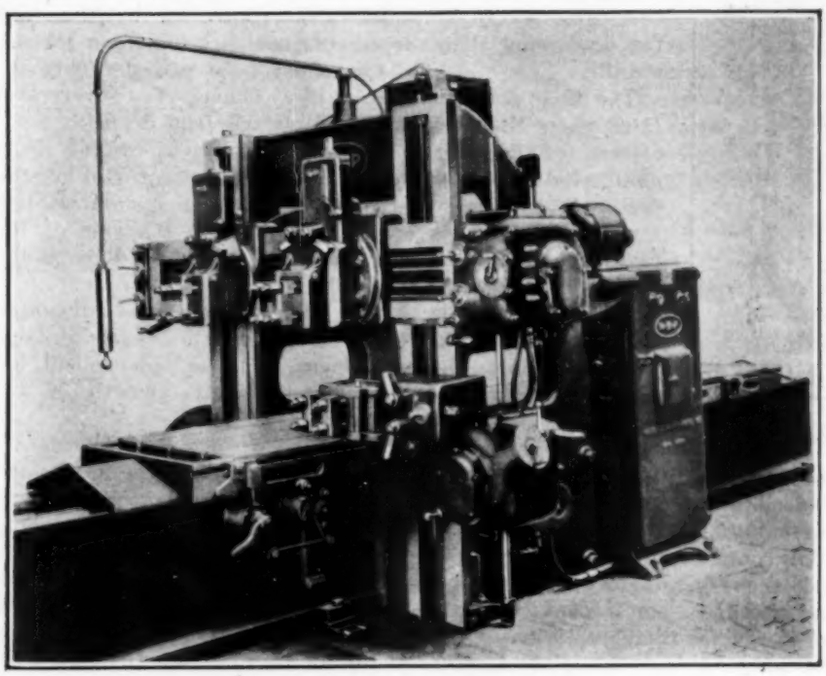


Fig. 1—Niles-Bement-Pond "Timesaver" Planer

An illustration of the planer, taken from the operator's side is given in Fig. 1. In this view is shown the pendant control switch, the unit construction of the side head, the feed and traverse drive motor mounted on the cross-rail, and the main control cabinet set back of the housing.

Another view, from substantially the same angle but taken close up to the cross-rail and side head, is shown in Fig. 2 to assist in a description of the head and cross-rail controls. The lever *A* is raised or lowered to traverse the cross-rail up or down, the direction in which the lever points corresponding to the direction of movement. When the desired position of the cross-rail is reached the lever is brought back to the neutral position in which it is shown and lever *B* is used to actuate a powerful clamping action between the rail and the columns. These two levers are interlocked so one cannot be used while the other is in working position.

The vertical and horizontal movement of each of the two heads mounted on the rail is accomplished independently, each head having its own lead screw and rod. The movements are controlled through clutches by two levers, one for each head. Each lever has five positions, straight, as shown, to disconnect all drive, up to raise the head it actuates, down to lower it, to the left to move the head in the same direction and to the right for the reverse of this movement.

Each of these levers *A*, *B*, *C* and *D* have duplicates mounted at the other end of the rail and connected to them by shafts so the movements can be controlled from either side of the table. The side head has its own independent set of controls.

The rods and lead screws for each head project from the end of the cross-rail. They are squared for a handcrank and are provided with micrometer collars.

A lever and dial *E* on the rail and another on the side head are used for setting any desired feed between $\frac{1}{4}$ in. to 1 in. in $\frac{1}{32}$-in. steps.

The motor drive for the traversing movements of rail and heads and for the feed movements of the former is shown in Fig. 3. It is mounted on an extension of the gear box housing at the end of the cross-rail and travels up and down with the rail. It is connected to the drive through a tooth clutch, the halves being held in mesh by a carefully calibrated spring. The angle of the teeth and the pressure exerted by the spring are balanced so the clutch will separate when the load has reached a certain amount that does not put a strain on the parts.

This arrangement protects the moving parts against damage should the heads be allowed to run together, or the side head be brought up against the cross-rail, or the latter be run to the limit of its travel on the columns. The motor rotates in one direction, reversal of a given movement being made by changing the setting of the direction-control levers already described.

A number of connecting shafts and attendant mechanisms have been dispensed with by the use of this type of drive, and feed for the tools has been made entirely independent of the length of stroke of the table.

The control of all movements of the planer is centered in a pendant switch which can be seen in Fig. 1 hanging in front of the rail above the table. It is attached to a bracket secured to the top column brace and can be swung to either side of the table as far back as the ends of the crossrail.

There are four working positions at which this switch can be set and operated as indicated in Fig. 4. At

SHOP EQUIPMENT NEWS

the top position *A* the source of power is disconnected from the drive as well as the feed motor and all other controls are rendered inoperative.

The next position *B*, attained by pulling the switch knob down, puts it in position to control the table-drive motor alone. Keeping the knob in this position vertically and then twisting it to the left closes contactors that cause the table-drive motor to rotate in a given direction, while twisting the knob to the right will reverse the direction.

In this position, therefore, the table can be inched along in either direction, while the feed motor is not affected, by manipulating the pendant switch.

Position *C* disconnects control of the driving motor and sets the switch to actuate the power contactors for the feed and traverse motor so this motor and the direction controls can be used, together, to set the rail and the heads for a given job. The knob is twisted while in this vertical position to run the motor, rotation continuing as long as the knob is so held in contact position whether for inching the parts along or for traversing them steadily.

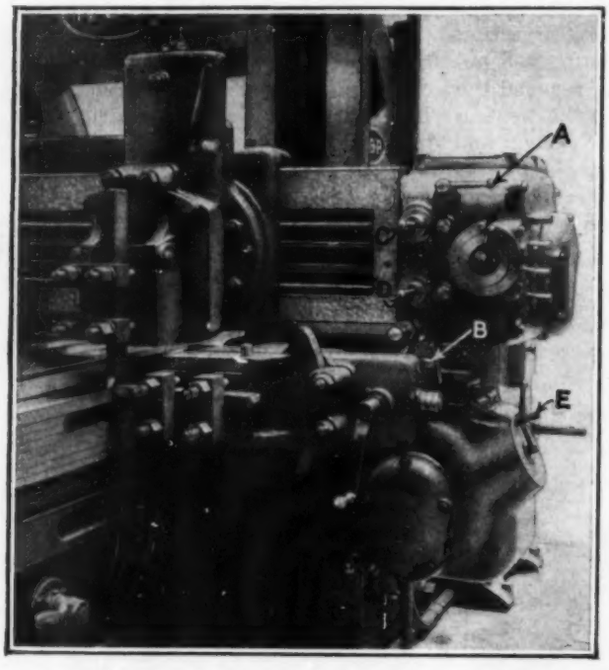


Fig. 2—A close view of the control levers

The final position *D* connects the contactors for the drive motor and those for the feed motor so the machine is ready to start as soon as the table control lever is moved to the working position. The table then travels to the end of its stroke as determined by the setting of the table dogs. The feed motor remains stationary until the end of the stroke is reached.

On contact with the dog at either end, the reversing lever is thrown and the drive motor contactors are set to reverse the driving motor. At the same instant the contactors to the feed motor are closed electrically by the movement of the reversing lever and the tools are fed in the direction determined by the position of the direction controls on the cross-rail. The amount of feed movement is determined by the setting of the feed dial on the rail. The feed motor contactors then open and the feed motor stops. This period of rotation of the feed motor does not start until the reversing lever begins to move and ends when the lever has reached its reversed position. The period is very short but is enough for the motor to rotate a distance that is more than sufficient to feed the tools through the greatest increment to which the feed dial can be set. For shorter feed settings the mechanism controlled by the feed lever cuts out a clutch when the set distance has been moved. This obviates any chance for overtravel with the electric-feed drive.

The feed movement can be made to take place at either end of the stroke by means of a small control switch mounted on the side of the column back of the feed-drive motor position.

The feed design has an advantage over the type which depends on table movement, as it is independent for its amount on the length of the stroke.

Ruggedness of construction is illustrated to advantage in the design of the cross-rail, toolheads, and head and rail clamps, the latter being shown in Fig. 5. The clamping levers at each end of the rail are keyed to a horizontal shaft running across the rail at the back. A cam at the center of this shaft actuates a steel plate which shows through the back of the rail in Fig. 5. The plate

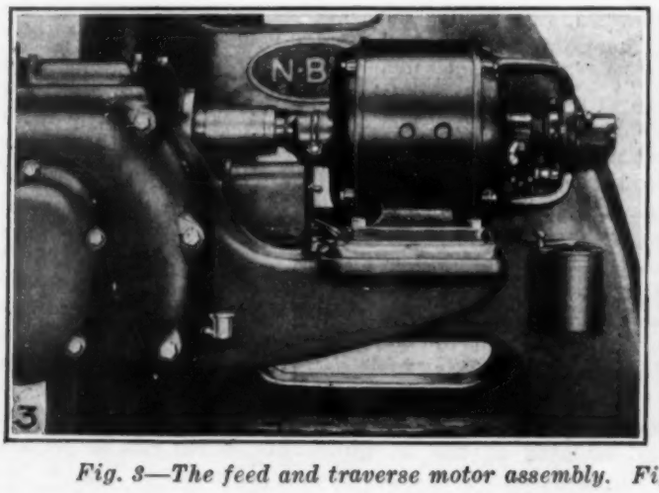


Fig. 3—The feed and traverse motor assembly.

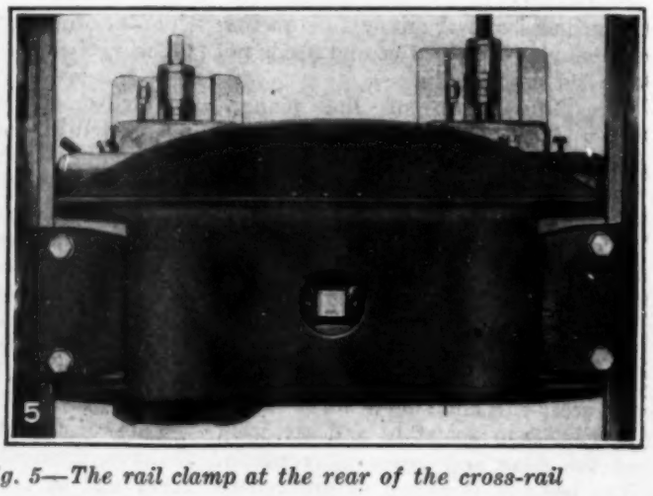


Fig. 5—The rail clamp at the rear of the cross-rail

SHOP EQUIPMENT NEWS

equalizes and transfers the clamping pressure to the ends of massive clamping levers that are fulcrumed under bolts near the housings. Clamping is then accomplished against the back of the column ways to pull the rail tightly into place. Adjustment is made by loosening or tightening the bolts. Clamps, operated by hand, are arranged on the heads to secure the slides to the heads and others serve to secure the heads to the rail. All of the clamps are conveniently located.

The cross-rail has been designed to resist upward bending by providing a stiffening web on the top. It has been made amply deep to resist backward bending and torsion. It is moved on its way by driving a pair of bronze nuts on the stationary

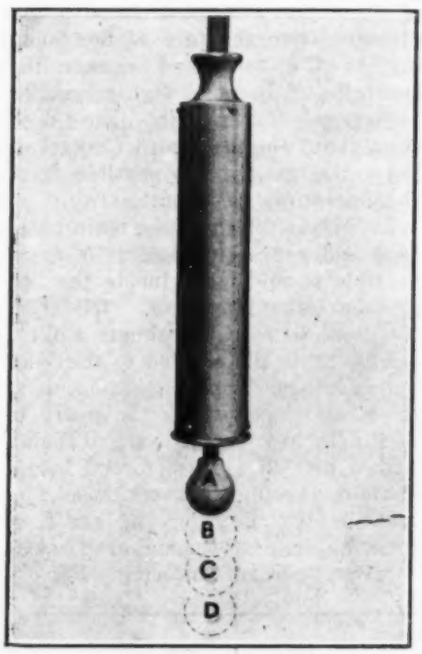


Fig. 4—The pendant switch

vertical screws. Adjustment is made, to square the rail, by means of nuts on these screws at the top of the housings.

The tool slides have been made wide and long to give the stiffness required by heavy roughing cuts and to provide a large enough surface to reduce wear and maintain accuracy. The saddles for the heads are cast integral to extend around the back of the upper rail. The heads have been offset so the tools can be brought close together. Taper gibs have been provided for all the sliding members.

The housings are made with wide faces to resist distortion and are provided with a long bearing on the bed to which they are doweled, bolted and keyed.

The side heads have been designed with an offset, the feeding and driving mechanism being set below the slides, so the side-head tool can be brought close to the cross-rail tool without any overhang in the toolslide on the cross-rail. The side-head tool is in line with the cross-rail tools so the table-travel setting can be the same for both.

Covers are provided on the top and at the end of the cross-rail and side-head gear boxes so all of the working parts can be gotten at easily. The gears are made of heat-treated steel, are hardened and run in a bath of oil. The bearings are lubricated from the splash of the gears and, in addition, by a hand-operated pump which is mounted on the cross-rail just below the direction-control levers for the heads. By means of this pump, oil is taken from the gear box and is elevated to a reservoir in the top of the gear box from where it flows to the various bearings through tubing. A similar arrangement is included in the side-head gear box. The gear boxes themselves are fully inclosed and are dust proof and oil tight.

The driving gears in the bed and table-rack are all made of steel and are generated according to the Maag system. These gears run in oil and, in addition, have oil pumped to them under pressure. They are bronze bushed and rotate on fixed shafts. The shafts are drilled through their centers and connected to the bushings so oil can be pumped directly to the bearings.

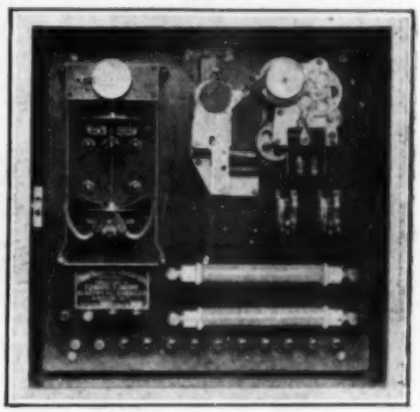
The oil pump is driven from these main gears for furnishing lubrication to them, to their bearings and to the table ways. Oil grooves have been planed in the table to assist in uniform distribution over the entire length. The heads are lubricated from one central oil cup on each head. In general, the lubrication system has been designed to provide ample oil for each moving part with but little effort or attention required of the operator.

The driving motor is intended to be direct connected on the side across from where the operator normally stands.

Pittsburgh Furnace Corporation, "Edmoore" Power-Demand Limitator

The apparatus illustrated and known as the power-demand limitator is being manufactured by the Pittsburgh Furnace Corp., Pittsburgh, Pa. It is intended for automatically controlling and limiting the "power demand," "peak-load" or "readiness-to-serve" charges on large power loads, where the charge for peaks drawn on "readiness-to-serve" is a large, fixed portion of the total power bill. The limitator, as its name implies, limits any unnecessary, unusual or short-time power peaks demanded.

Two induction elements are



Pittsburgh Furnace Corporation Power-Demand Limitator

mounted on a common shaft on the face of the panel board. The torsion or suspending wire is varied by a rotating dial indicating the secondary watts, so that any load setting can be obtained. When power in the circuit reaches the amount indicated by the dial setting, movable and stationary contacts co-act to close the lock-in relay. A load-adjusting rotating cam, mounted to engage the trip finger of the transfer switch of the integrating mechanism, closes a second relay which opens the relay to the outgoing control panel connecting the three-load adjusting resistances into the circuit and reducing the power input. The auxiliary-clock mechanism operates a demand-period cam.

It is necessary to have the limitator actuated from the source of power at the main metering point which it is desired to limit as to peak load.

SHOP EQUIPMENT NEWS

Cincinnati "Hypro" Openside Planer

The Cincinnati Planer Co., Cincinnati, Ohio, has placed on the market the "Hypro" openside planer illustrated in Fig. 1. This planer embodies all of the features that are used in the double-housing planer previously described on page 513, Vol. 62 of the *American Machinist*, plus a number of points that pertain particularly to openside-planer design.

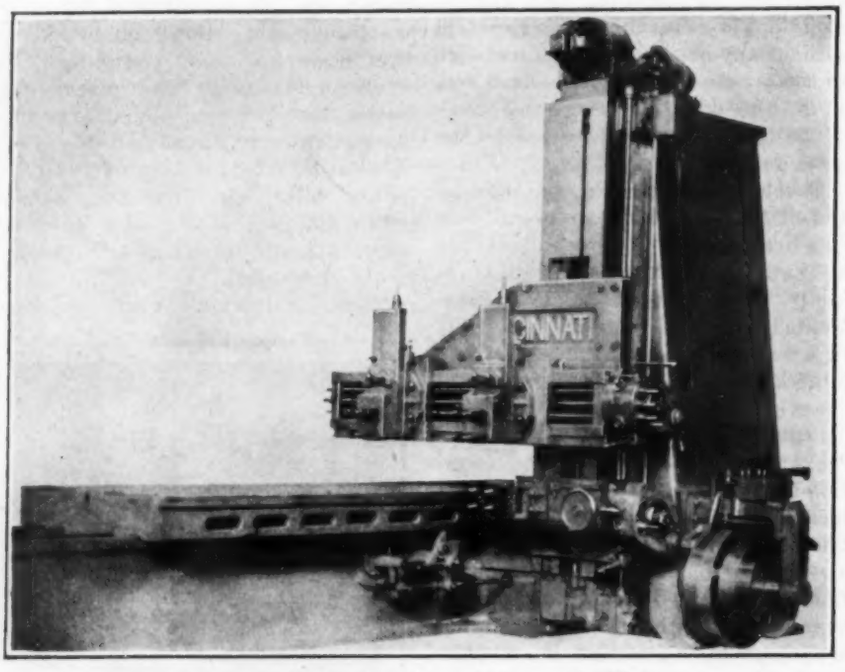


Fig. 1—Cincinnati "Hypro" Openside Planer

The selective dial feed is furnished for all of the heads, as shown in Fig. 2. A single turn of the knob gives a range of feeds from zero to 1 in. The feeds operate independently of each other and are foolproof. Turning the crank handle, at the end of the rail, automatically locks the rail and knee to the column at four places, giving the same rigidity as by the company's past method of tightening each bolt separately.

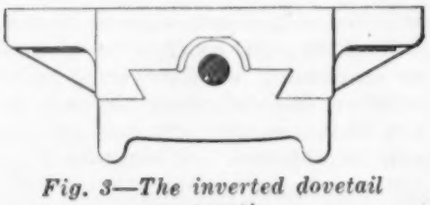


Fig. 3—The inverted dovetail construction

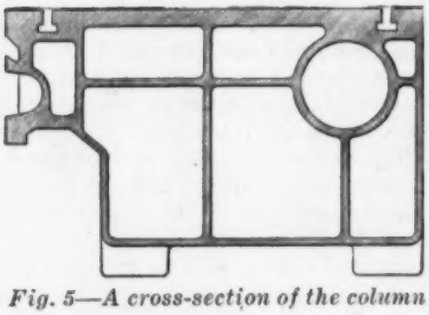


Fig. 5—A cross-section of the column

To eliminate accident, the elevating mechanism is automatically disengaged when clamping is accomplished. The handle for lowering and raising the rail is placed on the front in a convenient position for the operator. When the rail is in its extreme high position, a similar handle on the side head can be used to bring the rail down. An automatic trip disengages this mechanism at the extreme of its travel.

A safety trigger gear, shown in Fig. 2, has been placed on the rail and side heads. A knurled knob is used to change the direction of the feed. This eliminates the danger of having the operator's fingers cut.

Rapid power traverse is furnished to all of the heads, which can also be controlled from one handle or from independent handles placed on the end of the rail or on each side head. All of the heads are independent of each other, allowing one to feed while one or more of the others are being traversed. An automatic clutch is disengaged when the heads are run together or against the work.

The head slides are designed with the inverted dovetail, shown in Fig. 3. This increases the strength of the slides without increasing the distance from the face of the housing to the tool, and causes the dovetail to become tighter under pressure. Taper gibs are used throughout the machine. Control of the entire machine is possible from the operator's position.

Lubricant for the Vees, main bearings and gears is supplied by a reversible pump placed inside the bed over an oil-supply tank. Oil from the tank is forced through a filter before being distributed to the Vees and bearings. From the same source, oil is also sprayed on the gears to eliminate any chance of grit being picked up. The oil is forced into a chamber around the main bearing and, before reaching the shaft, it must again pass through felt wicks to give it a second filtering. For oil-

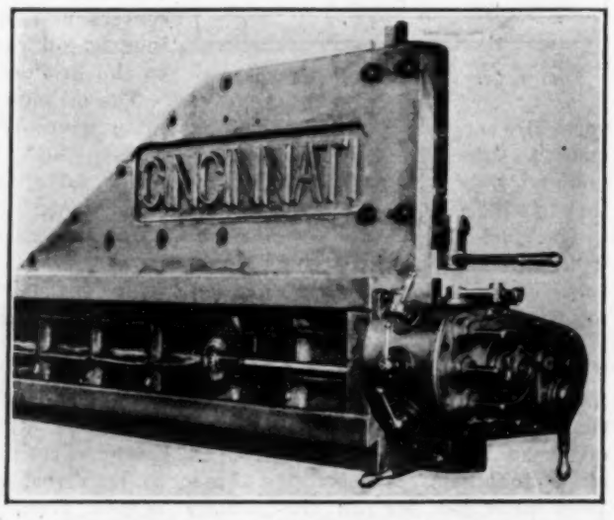


Fig. 4—The rail casting

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ing the Vees, the oil is forced through channels running the full length of the table to insure lubrication.

There are but eight oilers besides the force-feed pump. These are filled once every two weeks, and will then take care of all of the revolving parts and sliding surfaces on the saddles and slides.

The construction of the planer is such that the company guarantees accuracy and rigidity. The bed is double the length of the table, and both are of box-type construction. The table is furnished with inner guides fitting between the Vees. This tends to absorb all side thrust. A table clamp, on the outside of the bed, eliminates any possible chance of tilting when the work overhangs. The position of this clamp permits the chips to fall through, clearing the T-slots and keeping them ready for use at all times.

The rail and knee construction is such that spring has been practically eliminated. Fig. 4 shows the rail casting, in which it can be seen that the high wall is integral with the rail. The outline of the knee is exactly like the rail. The bearing of the knee and rail on the column are of substantial width and length.

The column bearing on the bed is extremely large, and the shape of the column is such that the barrel construction has been carried out. This construction is arranged to be on the inside of the casting, as shown in Fig. 5, and provides a place, out of the way, for the location of the sidehead counterweight.

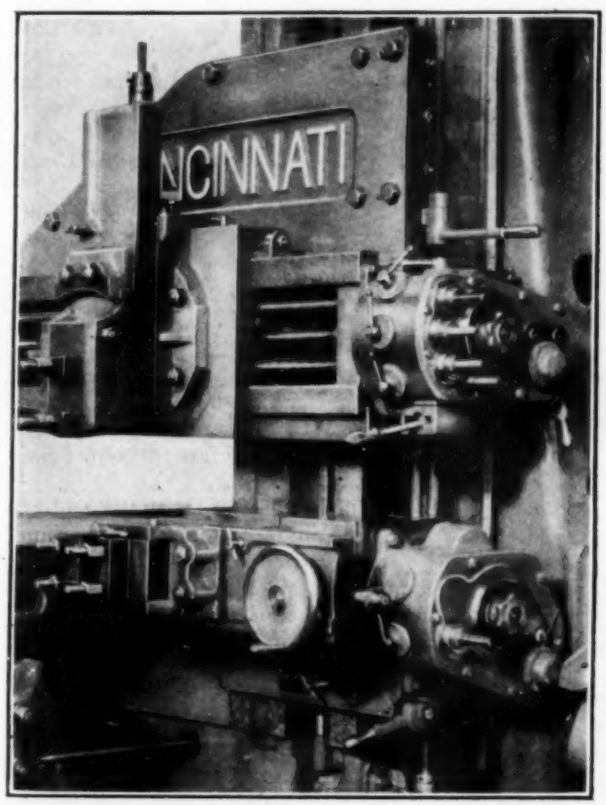


Fig. 2—A close-up view of the operator's position

Oesterlein "Ohio" Motor-Driven, Universal Cutter and Tool Grinder

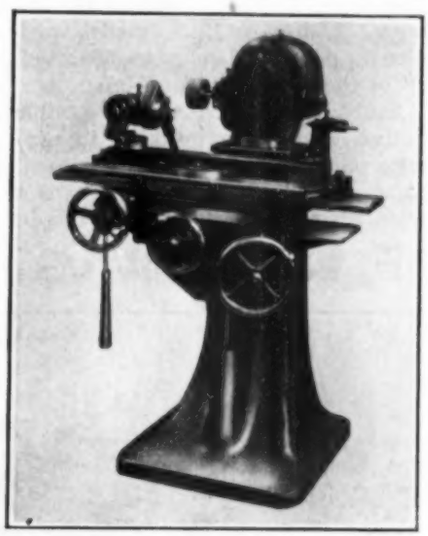
The Oesterlein Machine Co., Cincinnati, Ohio, announces the application of individual motor drive to its No. 2 universal cutter and tool grinder. The machine is of the knee and column construction and uses a planer-type table and saddle bearings.

The motor is mounted on the wheelhead, is inclosed, and drives the wheelspindle through a flexible coupling and a pair of spiral gears, of which the driven spiral is mounted directly on the spindle. Ball bearings are used throughout the head, there being two on the driving gear and four on the spindle. The spiral gears run in oil.

Any standard 1,800-r.p.m., ¾-hp. motor can be used to drive the machine. The wheelspindle head can be swiveled on its graduated base to 90 deg. in either direction, and can be locked in any position, thus making it possible to use a plain wheel for cylindrical grinding, and to throw the wheel spindle at right angles to the table and employ a cup wheel for cutter and tool grinding. A spring plunger is provided to lock the spindle.

The universal headstock is driven through a flexible shaft, one end of which connects to the rear end of the motor. The other end connects, through a jaw clutch, to a worm and wormwheel, mounted in a housing.

A lever for operating the jaw clutch is mounted on the wormwheel housing. This housing can be released by removing two screws, and can then be lifted off so that it is entirely out of the way of the operator when the machine is to be used for grinding small tools.



Oesterlein "Ohio" Motor-Driven Universal Cutter and Tool Grinder

Reciprocation of the table can be obtained by the handwheel for which there are two gear ratios, or by a lever that can be connected to the reciprocating mechanism.

The same equipment for tool, cylindrical, internal and surface grinding, that is used on the company's belt-driven machine, can also be employed on the motor-driven equipment and, further, any belt-driven No. 2 machine which is now in use in the field can be converted.

Standard Steel and Bearings Inc., Molybdenum Steel Bearing Balls

It is announced by the Standard Steel and Bearings, Incorporated, Plainville, Conn., that, in the future, molybdenum steel will be used in the place of chrome-alloy steel for the manufacture of the balls which are used in the company's ball bearings.

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Davenport 5-Spindle "One-Second" Automatic Screw Machine

The 5-spindle screw machine, illustrated, represents, with its ten independent tool carriers, the culmination of a long period of development by the Davenport Machine Tool Co., Rochester, N. Y., to improve the design of its original model previously described on page 669, Vol. 33 of the *American Machinist*.

Sturdy construction and flexible design enable the machine to produce parts at a high rate of speed, to accurate limits and adapt it to a wide range of work in steel and in brass.

The machine, compared to the number of functions it will perform, is simple to set up and adjust for a given job or to change from one run of work to another of different design. In fact, these operations are largely routine and require only an average care due to the engineering service and the operation-set-up sheets supplied by the company.

In addition to its ability to perform the usual screw machine operations, provision has been made for the addition of special tool-carrying attachments and automatic work-handling devices, to the standard machine, that permit the complete machining of parts which require such operations as milling, hobbing, slotting, cross-drilling and keyseating, without attention or handling on the part of the operator.

A front view of the machine is illustrated in Fig. 1 and shows the four points of manual control in positions convenient to the operator. At the left-hand side is the controller for starting and stopping the driving motor. Next, to the right, is the clutch lever which can be used to control the action of the tools by connecting or disconnecting the cam shafts from the power drive. Just above this handle is a finger latch by which the stock-feed into the machine can be put in service or allowed to idle. To the right, a handwheel is connected to the cam shaft assemblies so they can be turned over by hand. The finished work is delivered conveniently free from the chips through a delivery chute to the left, and just back, of the handwheel.

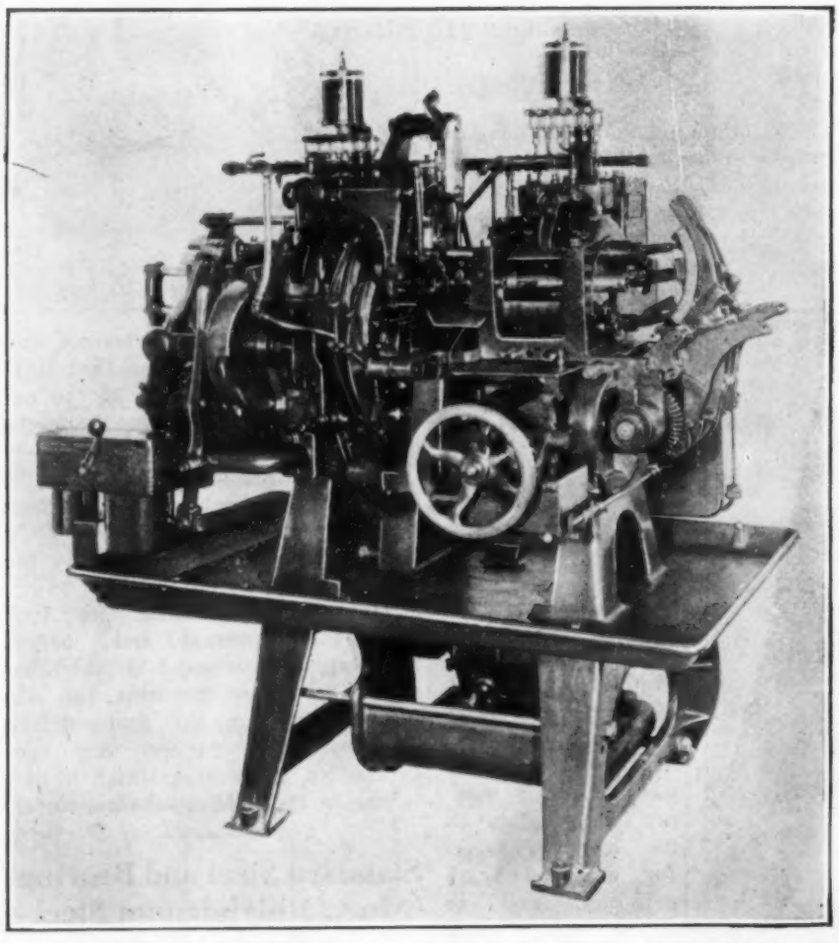

Fig. 1—Davenport 5-Spindle "One-Second" Automatic Screw Machine

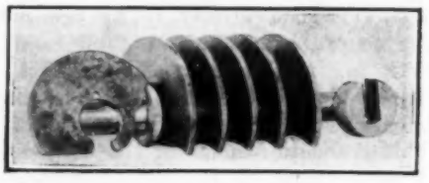

Fig. 2—One of the tool-feed cam assemblies

A complete coolant system to flood the work includes a force feed pump mounted at the rear and connected to the drive by a chain and sprocket, and a system of piping and control valves to deliver the coolant to individual tools. The coolant return and supply reservoir is a separate unit.

Lubrication of the moving parts is centered in two large oil cups with controllable distribution systems of sight feed drips and oil piping.

There are three camshafts on which cams are mounted to control all of the machine movements, with the exception of the spindle drive which operates as long as the motor is run. These shafts are mounted across the front of the machine, along the right-hand end and along the rear. They are connected by bevel gearing and are driven from two central points.

Beginning at the left-hand end of the front shaft, there is a drum-cam assembly which controls, in order as named, the stock advance, the chuck closing, the chuck opening, the index locking bolt and the head locating clamp. At the right-hand end of this assembly is the driving arm for the Geneva indexing drive, the housing for which is located just to the right of the clutch lever.

The stock-advance arm includes an adjustable slide arranged to be op-

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erated by means of a lead screw and a small hand-lever so the length of the stock, fed in, can be varied to suit requirements. The cam for operating the index locking bolt and the locating clamp is double acting so the movements of the bolt and clamp are positively interlocked and cannot lead or lag in relation to each other. The locating clamp acts to draw the front bearing cap tightly against the spindle barrel to secure it in each working position. The Geneva indexing mechanism is geared direct to the spindle assembly.

Two plate cams are located about midway of the front camshaft to drive a swinging toolarm, which is intended for final cutoff work, and a front cross-slide for carrying tools to do forming operations in the spindle intended for work on the part just after the blank has been fed in. This position is known as *A* and is the first at which work is performed.

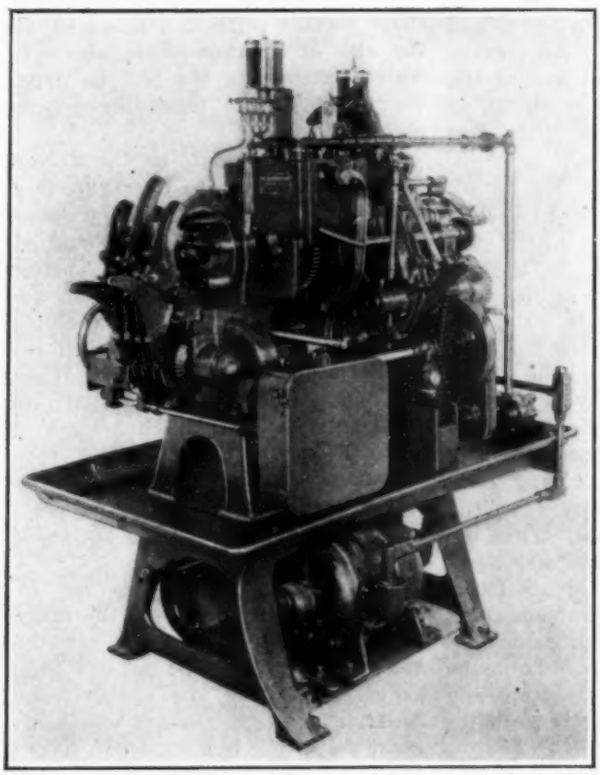

Fig. 3—A view at the tool-spindle end

Near the right-hand end of the front camshaft is a final drum-type cam which operates a lever to control a clutch shaft and drive mechanism located in the box below the handwheel. This cam is proportioned so, at the instant before indexing is to take place, it actuates a lever to disconnect a low-speed clutch and to instantly engage a high-speed clutch which drives the camshafts at a considerably higher rate of speed for the indexing period. At the end of this period the cam causes the lever to return the drive to the slower speed where it will remain during the working period.

This arrangement is designed for use on work in steel so the lower allowable speeds will not increase the idle tool time during the indexing period. It is a distinct factor in enabling the machine to complete whole manufacturing cycles in seconds or fractions, as its name "One-Second" implies.

For work in brass, however, the working speed can be maintained much faster than in steel so provision has been made in the design of the feed-speed shift to keep it in high at all times. The arrangement is a simple one.

One shaft has mounted upon it the clutches for high and low speed. It is located and can be seen below the right-hand end camshaft in Fig. 1. The lever from the speed-shift cam terminates in a fork surrounding the clutch shaft at its front end and shifts it lengthwise by means of a pin running through the shaft and fork. Just back of this lever is a stationary bracket through which the shaft fits. It is drilled to coincide with a notch in the shaft when the high-speed clutch is engaged.

To maintain high speed and render the shift-speed lever inoperative, the pin is removed from the lever fork and is inserted through the hole in the bracket and the notch in the shaft. In Fig. 1 it is shown in this latter position. The shaft bracket pin and lever fork can also be seen to advantage in Fig. 3. The springs on the shaft in question cushion the movements of the clutch forks.

The camshaft assembly at the end of the machine shown in Figs. 1 and 3, actuate the five tool spindles. The first one, counting from the front, connects the spindle in the *E* or cutoff position and the others, in order, control, positively, the forward movements of the tool-spindles *A*, *B*, *C* and *D*. Each tool spindle is returned to its out position, as its cam allows the spindle lever to recede, by means of springs.

Tool spindle *A* has an attachment set on its work end, in addition to the working tool, which acts as a stop for the stock as it is advanced through the chuck after a completed part has been cut off. This attachment is in the form of an angle plate set above the spindle so the stock rod can be pushed against it as indexing takes place between positions *E* and *A*. By the time *A* position is reached the correct length has been set and the chuck has been closed and is ready for the advancing tools in the front toolslide and in the tool spindle.

The position of this stock stop is adjustable by means of a bolt and latch located on the outer face of the tool spindle housing.

The tool spindle in position *D* is set up for threading work and is provided with a rotating drive and a clutch assembly to advance and retreat the tools from the work. Several designs of this unit are available and can be set in position *C* when this position brings the threading operation in better sequence for the work requirements. A two-speed drive is included in the assembly which is mounted in the box set at the rear of the tool spindle housing. The clutch is interposed between them. Its actuating arm can be seen in Fig. 1, pointing downward.

The design furnished with the machine, illustrated, is arranged to do the threading operation at the maximum cutting speed for the work in question and can be set to rotate in the same direction, but slower than the work is turning, to not rotate while advancing, or to rotate in the opposite direction. By shifting the clutch to the other speed drive, the tap or threading tool can be driven faster, in the same direction, than the work is turning to withdraw the threading tool.

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An understanding can be had of the necessity for this compact arrangement and for the sensitive action when it is said that many of the parts produced on this machine are finished at the rate of one per second. This time must include a period for indexing for threading and for backing off which leaves but a small fraction of the second for the clutch to release and grip again in the backing-off drive.

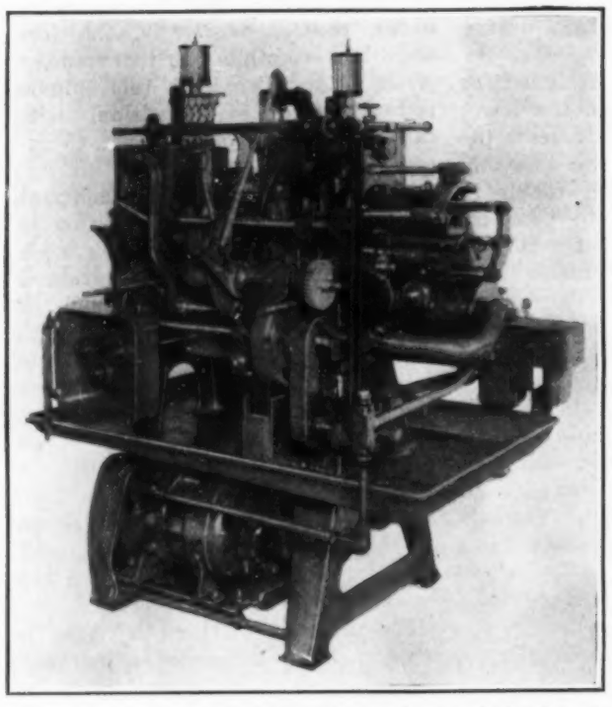

Fig. 4—A rear view taken from the work-feed end

One of the features of the machine is in the design of the arm and connection which transfers movement to the work spindle from each cam. The lower extremity carries a hardened roller which rides on one of the cams. The center is fulcrumed on a rockershaft. The upper portion is made in the shape of a quadrant and is machined into a slide in which a small block can be moved and set at varying distances from the fulcrum point. The quadrant is graduated and numbered to assist in repeating a given setting. A turnbuckle connects the movable block to the tool spindle.

The curvature of the slide is such as to have no appreciable effect on the relative position of the spindle when the block is moved, but the act of moving it toward, or away from, the fulcrum point decreases, or increases, the total movement of the spindle in relation to the cam. The turnbuckle serves to position the tool with reference to the work. The whole arrangement makes, in effect, an infinite number of amplitudes of movement available, within the range of the quadrant, when using one cam.

Backward movement of the cam arms is limited by stops and therefore it is not necessary to provide a continuous face on the cam to contact with the roller. This fact has been taken advantage of in the cam design as shown in Fig. 2 which illustrates an assembly of the end cam-shaft with its cam spacers and collars. An extra cam and one of the spacers is shown to illustrate the construction.

At its low point, the cam is cut through, the cut being sufficiently wide to slide over the shaft. In this position the cam is set on a shoulder of one of the collars on the shaft. The collar is driven by a feather key and drives the cam, in turn, through a pin that serves the double duty of driving and locating each cam in its correct relation to the movement of the machine. When the cam is in place the spacer is slipped between it and the next cam. Finally, the bolt on the end of the cam shaft is drawn tight to pinch cams and spacers tightly together. To make such a cam for a given motion and to place it on the shaft is a simple matter.

The rear of the machine with the rear camshaft, the slow-feed change gears, the main drive and the coolant pump are shown in Figs. 3 and 4, both rear views.

Counting from the left-hand end of the camshaft is a drum-type cam for shifting the threading-spindle clutch. The arm connecting this cam with the clutch shifter shows to advantage in both views. Next along the shaft and completing the list of cams, are two plate cams to actuate the rear toolslide for working position *B*, the rear tool arm for work-position *C* and a vertical tool-slide at work-position *D*. This vertical toolslide is not regularly furnished with the machine.

For work that requires a considerable depth of cutoff, this vertical slide is used to start and partly complete the operation, while threading is being done, in order to save time, again measured in fractions of a second, at *E* the final cut-off position.

The driving motor is mounted on an adjustable support below the pan and drives through a Morse chain to a shaft at the back which is geared to another shaft set between it and the spindle head. A gear on the left-hand end of this shaft meshes with a ring gear which, in turn, drives the spindles. Another gear on the right-hand end of the same shaft meshes with one mounted on the end of another shaft above it which extends to the left to drive the gears in the threading-spindle assembly.

On the same shaft as the driven sprocket, and just to its right, is a pinion which meshes with a large gear that drives the power end of the cam-drive clutch. The shifter fork and clutch can be seen to advantage in Fig. 3. When the clutch is thrown out the shaft which extends to the left is stationary. When the clutch is engaged this shaft rotates and drives through a train of gearing mounted below the tool-spindle housing to the high-speed indexing and feed drive at the front of the machine and to the low-speed feed drive at the rear.

The high-speed drive is not intended to be altered from the maximum point at which it is set, but the low speed can be set, to meet requirements, by the proper combination of change gears which are mounted in the box shown in Fig. 4 with its cover hinged back. The gears on the main drive to the threading spindle and to the work spindle can also be set to fit conditions.

In these rear views, as well as the one of the front of the machine, numerous guards were removed at the time of taking the photographs to assist in an understanding of the machine. It should be stated that, when shipped, each machine is thoroughly guarded with substantial

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cast iron guards over all parts that might be points of danger or of possible trouble, should parts and chips fall into them.

In Fig. 5 is shown a sub-assembly of the work-spindle unit as it appears when lifted from its bearings

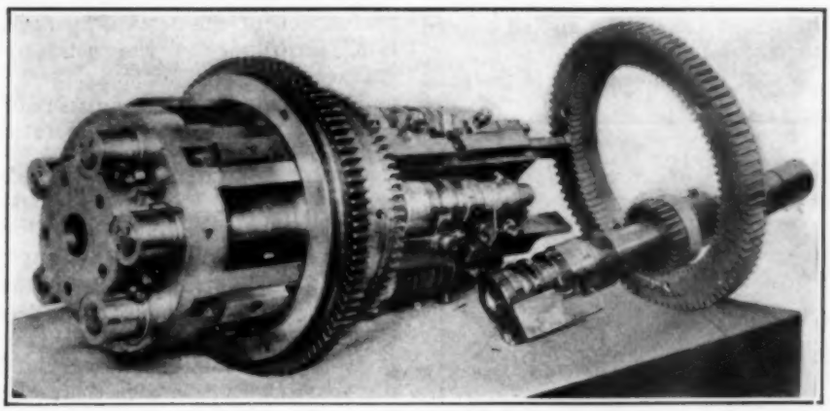


Fig. 5—The work-spindle assembly

in the head. In addition, an extra ring gear and a separate spindle are shown to illustrate the construction to resist wear and keep driving friction at a minimum.

The ring gear, which completely surrounds the head and meshes with the pinions on the spindles, is provided with a bearing surface adjacent to the gear teeth, ground accurately to the pitch line of the gear. The pinions on the spindles also have hardened rollers ground to the same diameter as their pitch lines and set next to them. The ring gear, therefore, is supported on a rolling contact at five points around the head assembly. Continued service, with but small signs of wear, have confirmed the wisdom of this design.

The sturdy construction of the entire work-spindle assembly can be seen in the illustration. At the left-hand end is the location of the clamping bearing for securing position of the assembly close to the ends of the spindles. The other bearing is to the right of the ring gear, and between it and the indexing gear. In fact, the bearing itself is a shoulder integral with the latter gear.

To the right of the ring gear can also be seen the substantial stops with which the index-locking bolt registers. These stops are set into recesses in the solid head and are held in place by screws into the head. The spindles themselves ride in high-quality bronze bushings and are unit assemblies.

The company maintains an engineering service for the users of the machine, and for prospective users, to work out recommendations for set-up and tooling from submitted samples of new work and, when given the contract for tooling or furnishing the complete machine, will guarantee the rate of output. When attachments are needed for an existing machine, or when they are to be furnished with a new one, the same procedure is followed.

To install the machine, all that is needed is a power line and space in the production department as each one is furnished complete to specification and is tested on the work it is to perform before being shipped.

Automatic Nut Thread Corporation, Nut-Threading Attachment

The Automatic Nut Thread Corporation, Buffalo, N. Y., has put on the market a device for threading nuts and other small parts as they are formed on automatic screw machines. The attachment is intended to eliminate the use of the reverse drive and the independent tapping machine. It is called the automatic nut-threading attachment. It is used in conjunction with the transfer arm of the Brown & Sharpe slotting attachment. It taps the nuts or other parts as they are formed and cut off.

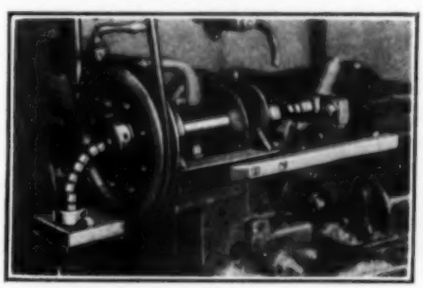
The attachment is illustrated on a Brown & Sharpe machine. A plunger is fitted to the slotting-attachment transfer arm. This plunger enters the nut blank as soon as it is drilled and, when it is cut off, immediately swings the blank nut over to the threading attachment, which takes the place, on the automatic screw machine, of the usual slotting-attachment head.

As the transfer arm reaches the upright position, it pushes the blank forward into a hexagon socket, or chuck which revolves around the tap. The nut is automatically carried onto the tap, passes through a hollow spindle, and slides out at the end of the tap shank.

The dropping of the nut is controlled by a special sleeve arrangement so the tap, which is of the floating type, is always full. The taps are bent at the shank end at an angle of 90 degrees.

The attachments are simple in construction and are sturdily built. The spindle is mounted in a high-grade type of ball bearing. The necessary adjustments are few and can be made readily by any good set-up man. The makers claim that the attachment effects a saving in production costs by doing away with the necessity of sorting blanks from the scrap in the pan, cleaning them, and sending them to an independent tapping machine.

It is intended to eliminate tap breakage, and to reduce inspection rejections to a minimum. The finished nuts, tapped in this manner,



Automatic Nut Thread Corporation, Nut-Threading Attachment

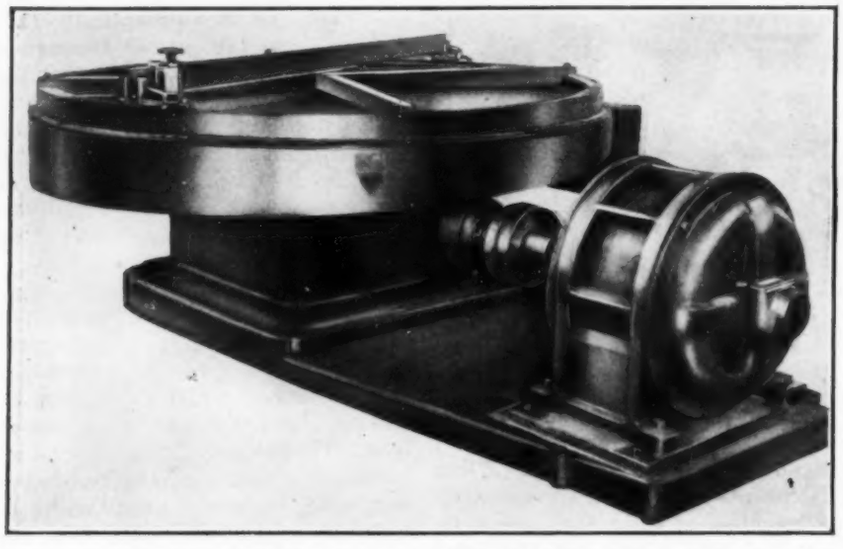
are practically all of full thread and are tapped accurately square with the face.

At the present time, attachments are being supplied for the Brown & Sharpe automatic screw machines Nos. 00, 0 and 2. The makers expect to soon perfect attachments for use with other makes of automatic screw machines and will then announce them.

SHOP EQUIPMENT NEWS

Gardner Vertical Spindle Disk Grinder 72-In., No. 79

A disk grinder carrying a disk wheel which measures 72 in. in diameter, and designated as the No. 79 machine, has been placed on the market by the Gardner Machine Co., Beloit, Wis. It has been developed to handle numerous large flat-surface jobs which cannot be accommodated on the smaller machines built by the company. It is, in effect, an enlargement of the 53-in. Gardner grinder, although it embodies several distinct features in its construction.



Gardner Vertical-Spindle Disk Grinder, 72-In., No. 79

The steel disk wheel is 1¼ in. in thickness and is reinforced by a 40-in. steel plate 1 in. in thickness, to provide support extending well out toward the circumference of the 72-in. wheel. It is mounted on a specially heavy wheel collar, or flange, measuring 29 in. in diameter, which is shrunk on the spindle, machined and balanced.

The driving spindle runs in two self-aligning radial ball bearings. All down, or end, thrust is taken on a self-aligning ball-thrust bearing which contains steel balls measuring 1⅛-in. in diameter. It is rated to carry a load of 10,400 ponnds.

Power is transmitted to the disk wheel by means of hardened special-steel bevel gears. These gears are fully inclosed within the machine base, and provision is made for ample lubrication. They are completely protected from dust and dirt.

A dust channel is cast into the base of the machine and communicates with a series of ports of ample size which are equally spaced around the circumference.

A cast-iron guard ring is fastened to the top of the base. Any portion of this ring may be removed, permitting the grinding of work carrying lugs which project above the plane of the ground surface. Work holders can also be secured to this ring.

The machine can be furnished in both belt- and motor-drive design, although the illustration covers the motor drive only. In the case of the belt drive, the countershaft is built into and forms a part of the machine. It is provided with tight and loose pulleys, the latter being fitted with ball bearings.

A special pneumatic press, for use in setting up the disk wheel, is furnished with the equipment. It is made of sheet steel, pressed into oval shape on the top. Entirely across the bottom, is attached a thin sheet-metal diaphragm with an arc-welded, air-tight joint at the edges. In operation, after the steel wheel and back of the abrasive disk have been coated with cement and placed together, the press is put on top of the assembly and, with numerous malleable iron clamps, is secured firmly to the outer edge of the disk wheel.

Air is then pumped into the cone, with the pump furnished, until the gage shows between 5 and 7-lb. pressure. This is equivalent to 14 tons on the entire surface of the wheel, and is the amount required to make a perfect job of the setting-up operation, according to the company's engineers.

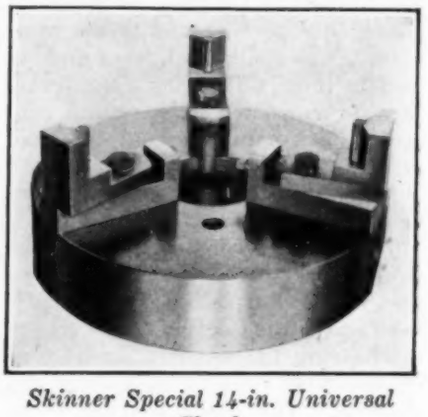
The machine weighs approximately 10,000 lb. and occupies an operating floor space of 12x12 feet.

Skinner Special 14-in. Universal Chuck

The 3-jaw universal chuck, illustrated, is being built by the Skinner Chuck Company, New Britain, Conn. It is primarily intended for chucking gears concentric with their pitch lines.

A 2-piece jaw is used, the top half being adapted for holding the gears and also being adjustable in two directions. This makes it possible to hold work with an even, or an odd, number of teeth. The upper portion of the jaw is made in an "L" shape and is held in position on the lower-jaw portion by means of a substantial clamping bolt.

The end of the upper section is threaded for a screw which projects through the shoulder in the lower section and takes the thrust of the work against this shoulder. The gears are located on the upper jaw against pins.



Skinner Special 14-in. Universal Chuck

The chuck can be made in sizes to hold gears measuring from 3 in. to 42 in. in diameter and, if desired, can be furnished in a dustproof design for use in connection with grinding work.

SHOP EQUIPMENT NEWS

Sykes Universal Shaft Coupling

The Farrel Foundry & Machine Co., Buffalo, N. Y., has developed and added the Sykes universal shaft coupling to its lines of power-transmission equipment. Its adaptability is unlimited within its size range, which at present covers shaft sizes from 1 to 8 in., inclusive, and is to be increased as may be warranted. Speed is not a deciding factor in any size. The action of the parts corresponds to that of a universal joint and permits of an angular misalignment to a limit of 5 deg. In addition, it will operate without difficulty under an offset condition between driving and driven shafts up to 4 per cent of the shaft diameter.

The coupling is shown in Fig. 1, in which the parts have been cut away to assist in an understanding.

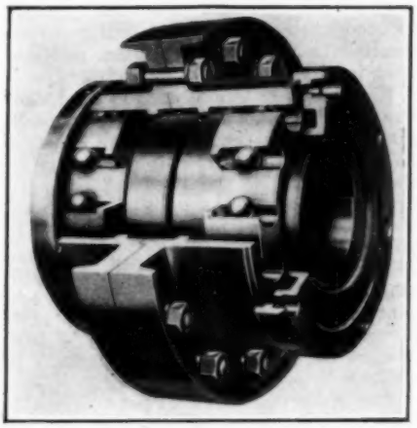


Fig. 1—Sykes Universal Shaft Coupling

Aside from the driving balls, there are three pairs of steel parts. Two inner identical hubs are arranged for clearance between their adjacent ends and are intended to be keyed respectively to the driving and the driven shafts. A pair of flanged sleeves, also identical, fit over the hubs with ample clearance and bolt together at the center. A pair of plates are bolted to, and cover, the outer ends of the sleeves projecting down to the hubs, but again leaving ample clearance.

Each half sleeve and one of the hubs are set in a jig and drilled to form a series of pockets for balls which transmit motion from the driving hub to the sleeve and on to the driven hub. The end plates prevent the balls from falling out. All contact, therefore, between hubs and sleeve is through the balls.

For any condition of misalignment or combination of conditions, the balls will take up certain relative positions in the recesses and will continue the functioning of the coupling without any binding action. In fact, it was shown in a test under running conditions that the rotor of a motor, driving through one of the

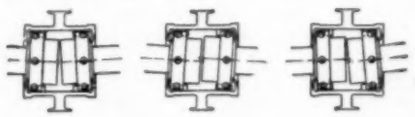


Fig. 2—Diagrammatic illustrations of allowable misalignment

couplings, was as free to float endwise when bad misalignment existed as it was when its shaft was exactly true with the one it was driving.

Action of the balls in the slot, contrary to natural assumption at first glance, is very small when misalignment exists and units that have been in service over long periods of time show practically no wear. The balls used are of the same standard of hardened steel and of dimensional accuracy as are employed in high-grade ball bearings and have line contact in their pockets irrespective of the inaccuracy of shaft alignment.

Lubrication is not a problem, and while the company suggests packing the ball pockets with grease, once upon installation, tests have shown that no serious effect will result by not furnishing any lubricant.

The coupling is not designed to give torsional resiliency, and while this quality can be provided with a slight modification in the design, it is not recommended.

In the range named there are 13 sizes of coupling that will transmit from 2½ hp. at 100 r.p.m. in the smallest size up to 1,200 hp. on the same basis for the present largest, or 8-in. size. Maximum recommended speeds vary from 15,000 r.p.m. on the 1-in. coupling to 2,000 r.p.m. on the 8-in. coupling.

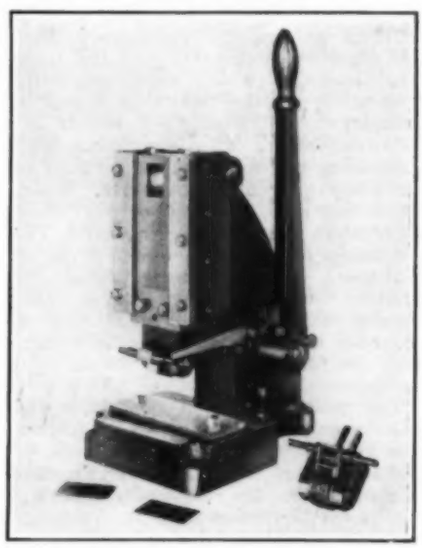
The company has prepared a table showing the essential dimensions of each size and the oversize that can be allowed in the bore for couplings over 2½ in. in diameter, together with other data that can be had upon application.

Noble & Westbrook Numbering-Machine Press

The numbering-machine press, illustrated, is being marketed by the Noble & Westbrook Manufacturing Co., Hartford, Conn. It is designed for use in connection with numbering machines for the numbering of metal plates or other metal parts. It is also suitable for work such as light blanking, stamping or lettering since it has ample power and is accurately made. It is built in one size, at this time, but a smaller size is to be added later.

Due to the reasonable cost of the press a numbering head can be kept in place at all times and numbering can be done as occasion requires. Consecutive serial numbers, worked automatically with each stroke of the handle, or the same number, can be stamped continuously.

Power is applied by a lever with a toggle-joint movement which makes the action smooth and easily operated. The ram of the press is substantial and has a gib to take up the wear.



Noble & Westbrook Numbering-Machine Press

Numbering heads, such as are used in the press, have been manufactured by the company for some time. They are made to order with any number of wheels from 2 up and with letters of any size desired. The frames are made of mild steel and are nickel plated. The numbering wheels are made of a special high-grade tool steel.

News of the Week

Management Week Observed by Leading Engineering Societies in Country

Waste in distribution is general theme of discussions

Taking as its general theme "Waste in Distribution," the engineering bodies throughout the country properly observed Management Week from Oct. 19 to 24, with a series of meetings at which the speakers took up the various phases of the subject of waste. Four major societies co-operated in this work. They were the American Society of Mechanical Engineers, the Taylor Society, the National Association of Cost Accountants and the American Management Association.

Secretary of Commerce Hoover, who is the country's most persistent foe of waste, was honorary chairman of the co-operative committee. Mr. Hoover sent the following letter to each committee in charge of local meetings.

HOOVER'S LETTER

"It is particularly appropriate that the organized engineers and the technical societies which were originally responsible for the report on Waste in Industry in 1921, should follow that initial achievement of co-operating with the managerial and business groups in the observance of Management Week. These meetings, held year by year since 1922, show gratifying progress. The elimination of industrial waste is one of the most important undertakings of our time and it is proper that at least once a year we should take stock of progress and that in these meetings, held the country over, we should plan for future advance."

The meeting held on Oct. 22 in the auditorium of the Engineers' building was presided over by Arthur Foote, of the Bureau of Standards, Department of Commerce. He reviewed the organization of the department at Washington that is intended to co-operate with industry in attacking waste in materials manufacture and distribution. He told of the six committees that were formed and are soon to report on the main phases of the subject in order to set down facts on which to base future activities.

He then introduced C. K. Woodbridge, president and sales manager of the Dictaphone Corporation, and president of the Advertising Clubs of the World. Mr. Woodbridge addressed the meeting on that phase of the subject which deals with distribution.

His stand was that the initial movement for simplification in distribution must originate with the consumer on whose indulgence with wasteful practices depends any movement pointing towards its elimination. Mr. Woodbridge upheld the American method of business stating that it had kept pace with the growth of industry.

In the branch represented by sales, than which he holds there is none greater or more responsible for prosperity in business, the crux of the situation is, he believes, in the manpower available and the manner in which this power can be trained and personally assisted. He attributed to Secretary Hoover the honor for having shown industry that ideas for betterment in business can be interchanged without personal loss and to the benefit of everyone.

COMBINING INDUSTRY

He outlined a future possibility of combining industry in selected zones for operation in those zones as a means of cutting expense in distribution, but stated that any such arrangement would necessarily be voluntary or under government direction. To support his stand that the choice of the words —elimination of waste—is unfortunate he cited examples of expenses unavoidable in present-day distribution. He spoke of the danger of losing sight of the individual in the search for scientific methods and returned to his point of the importance of personality highly developed as the necessary rule. He spoke of the importance of budget control as a fundamental in business, of the high cost of distribution being a result of public demand for more and better service, of the problem being one of education, of boosting the average by helping the "tail enders."

GOVERNMENT WOULD HELP

Mr. Foote told of the desire of the Department of Commerce to co-operate in the furtherance of better living for all, and related specific points of good that have been accomplished and spoke of the trouble met by the department in interesting the individual. He then introduced L. W. Wallace, executive secretary of the American Engineering Council and vice-chairman of the committee for the elimination of waste in industry and a member of the planning committee to direct the activities of the conservation council.

Mr. Wallace reviewed the circumstances surrounding the choice of the term "elimination of waste" in a meeting held of a committee of five in which Secretary Hoover and he were members. He upheld the term with deference to the stand taken by Mr. Woodbridge and cited examples of actual good that had been accomplished. He told of the fact that the report of the Department of Commerce on waste elimination had been translated into several languages and is finding wide circulation in European countries where the study of waste in all branches of industry is becoming a most important thing.

He pointed out that one of the greatest examples of waste today is in the conduct of the governmental offices and cited examples of actual wasteful practice. He showed the parallel to this condition in industry and in private life and gave the fact of the present coal strike as a direct result of one of the basic troubles which he named as seasonal industry. He outlined the circle of conditions leading one to the other and referred to several points in this circle as further confounding a confounding confusion. He held that individualism was one cause for variety in products as to size and design which resulted in unnecessary waste, particularly in the production department.

He reviewed examples of good that has been accomplished in the campaign and cited others that should be checked. He stated that in his opinion we are on the threshold of the greatest competition we have ever known to dominate the world market and that if we are to win we must be prepared.

He finally outlined four points to consider in approaching the problem and named them as intelligent management, a reduction of seasonal industry, a promotion of research and a reduction in variety.

The American Management Association held its meeting on Oct. 21, the speakers being Mr. Wallace, and Mr. Woodbridge. Other meetings were held at Buffalo, N. Y., Meriden, Conn., St. Louis, Mo., New Haven, Conn., and Toledo, Ohio.

H. C. L. Going Down

The cost of living index number of the National Industrial Conference Board showed very little change between Aug. 15 and Sept. 15, 1925—a decrease of 0.3 per cent. Food prices, rents and the cost of certain sundries declined slightly while clothing costs advanced in the same ratio. Coal prices averaged 2.3 per cent higher in September than in August. This is more than the seasonal increases expected at this time of year, but on the whole the advances for bituminous coal were greater than for anthracite, particularly in cities where little anthracite is burned as a domestic fuel.

Between July, 1920, when the peak of the rise in the cost of living since 1914 was reached, and September, 1925, the cost of living decreased 17.8 per cent. The increase in the cost of living since 1914 was 68.2 per cent.

Over Two Thousand Prospective Machine Tool Buyers in Czechoslovakia

Competition of German manufacturers waning

Czechoslovakia offers an active and immediate market for American manufacturers of machine tools and factory equipment. There are approximately 2,100 factories, employing 133,000 workmen, which can be classed as potential buyers of machine tools. Of the total number of factories, 90 can be classed as large according to American standards, about 300 are medium sized, and the rest are small shops that have from one to five tools in their installation. This is the gist of a report just made to the Department of Commerce.

Factories using machine tools may be roughly divided into two classes, when one considers the possibilities for selling American equipment: Those manufacturing agricultural equipment, sugar-making machinery, brewing machinery, equipment for alcohol distilleries and starch factories; and those manufacturing railway equipment such as locomotives, cars, and rails—this first group constituting about one-half of the total, from the point of view of sales, in the industry of Czechoslovakia; and a second group representing automobile and electrical equipment factories, comprising about one-fifth of the total.

The concerns under the first group offer the best prospects for the sale of American machine tools. They are now increasing their output after having passed through a serious period of depression following the war, and have not as yet reached their maximum production, with the exception of the agricultural implement and sugar machinery factories. The activity of the factories in this group is increasing rapidly, owing to the development of their export business. Many of the concerns are not equipped with modern machine tools. Their poor financial condition resulting from the long period of depression and the low prices at which they are selling their products at present do not permit of an accumulation of surplus for capital investment. However, these plants are the largest individual units in the metal working industry of the country, and a number of them are actively negotiating for foreign loans, which, if obtained, will provide the necessary capital for purchasing new equipment.

The second group, which is comprised of the automobile and electric-equipment factories, is very well occupied and is financially in a better position than the first group. In addition, the firms engaged in the manufacture of automobiles and electric equipment are now endeavoring to standardize their production, as well as to modernize and enlarge their shops. This has already resulted in substantial sales of American machine tools.

Probably the most encouraging factor in selling American machine tools in this market is the temporary reduction—effective till Dec. 31, 1926—in the customs duties on imports of noncompetitive machine tools and equipment, which took place in the spring of this year. These tariff reductions have served to stimulate the modernizing of Czechoslovak industry and have resulted in a pronounced increase in the sales of American machine tools during the current year.

Prior to the war, the present territory of Czechoslovakia was principally dependent on Germany and America for machine tools, the imports from other countries, such as Sweden, Switzerland, and France, being insignificant. German manufacturers practically controlled this market during the war and up to and including the year 1922, but, with the stabilization of the Czechoslovak currency and the gradual increase in German production costs, there has been a pronounced penetration by American machine-tool manufacturers into this market.

The American exporters had to contend with the lower prices quoted by German manufacturers for similar tools and equipment. The credit concessions granted by German manufacturers were also a difficult handicap to overcome. Another factor which has been of great assistance to German machine-tool manufacturers has been their proximity to this market as compared with American producers. To offset all of these difficulties the American manufacturer has only been able to call attention to the quality and durability of his products, and it is owing entirely to this consideration that American machine tools are making the headway which they are in Czechoslovakia.

The price differentials against American machine tools with those of German manufacture are gradually being wiped out by the steadily increasing cost of production in Germany.

It may be anticipated that the development of this territory as a market for American machine tools will continue.

Survey Shows Farmer Is More Prosperous

Although the economic position of agriculture has been more unfavorable since 1920 than at any time during the preceding 20 years, the farmer this fall is looking up and is operating with greater confidence in his immediate prospects than he has done at any time since 1920.

Such is the picture presented by the facts gathered by the research staff of the National Industrial Conference Board in the course of an exhaustive study of the agricultural situation as it has developed during the last century, and of the effects it was subjected to during the war and the post-war period.

In appraising the present outlook, considerable weight is given by the board to the marked increase of activity in the agricultural implement industry from July to August of this year, following a similar strong upturn in the same industry earlier in the year, more pronounced than the activity in the corresponding periods in recent previous years. Sufficient new hands were taken on in the agricultural implement factories from July to August to effect a total increase of 5 per cent in employment in the industry as a whole, average weekly earnings increased and working hours were extended nearly an hour per man per week on an average. The present increasing momentum in the implement industry is regarded by the conference board as reflecting both increasing purchasing power of the farmer and increased confidence on his part in his immediate future.

Fiftieth Anniversary of the Link-Belt Company

Fifty years have passed since the incorporation of the Ewart Manufacturing Co., the forerunner of the present Link-Belt Co., in 1875. In commemoration of the fiftieth anniversary, the latter company has published an attractive book entitled "Link-Belt 1875-1925."

In this book it is mentioned that the patent of William Dana Ewart, a young implement dealer, from Belle Plaine, Iowa, for the detachable link chain, was dated Sept. 1, 1874. Mr. Ewart first started to build a self binding harvester, but he realized the great need in such a machine for a detachable chain drive that could be repaired in the field; and he worked out the idea of a chain drive, the links of which could easily be replaced by the farmer.

Late in 1874 when Mr. Ewart came to Chicago with a view to arousing some interest in his "detachable link chain," he succeeded in interesting John C. Coonley, a lawyer who was then president of the Chicago Malleable Iron Co. As a result a company was duly incorporated in 1875, under the name of the Ewart Manufacturing Co., for manufacturing detachable link chain. In 1876, these chains were exhibited at the Philadelphia Centennial.

New uses for the invention developed rapidly, and in 1880 the Link-Belt Machinery Co. was incorporated. In 1888 the Link-Belt Engineering Co., was formed, with a plant in Philadelphia. In 1906 a consolidation of the three interests took place, and Charles Piez was elected president.

Mr. Piez is now chairman of the board of directors, and Alfred Kauffmann formerly vice-president in charge of the two plants in Indianapolis is now president of the company.

British Cutlery Interests Ask Government Protection

A committee has been appointed to pass on an application of the British cutlery trade for protection under the Safeguarding of Industries Act, says a cable to the Department of Commerce from London. The representatives of the cutlery trade claim that they are unable to sell their products in the face of German and American competition. The products which are said to be chiefly in need of this protection are pens, pocketknives, and scissors.

The Business Barometer

This week's outlook in Commerce, Finance, Agriculture and Industry based on current developments

By Theodore H. Price
Editor, *Commerce and Finance, New York*

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ON MY way downtown Friday morning, Oct. 9, I stopped in one of the chain tobacco stores to buy a cigar. As I stood at the counter a shabbily dressed woman, obviously a foreigner, approached the salesman and showed him a clipping from a morning paper, in which it was suggested that J. B. Duke's death might cause a decline in the stock of a certain tobacco company.

"Is that so?" the woman queried.

When the salesman answered that he knew nothing about the stock market the woman turned away, remarking disconsolately: "I have some of that stock and thought that you would know about it, as you are in the tobacco business."

The incident sheds an interesting light upon the recent fluctuations in the New York stock market.

It is the fashion to say that the activity is due to the operations of "the cliques." This seems doubtful. The odd-lot trading, which is not included in the totals of the transactions reported, is now supposed to average nearly 25 per cent of the recorded aggregate of 100-share lots, and those who keep their ears open to conversation that is to be heard in crowds will probably admit that a very large proportion of the New York public is at present interested in the fluctuations that the stock ticker records from day to day.

Whether this is true of other communities than New York I cannot say, but, if it is, then the present bull movement in stocks is nationwide in its inclusiveness.

This is one reason why its duration has been so difficult to gage. Prior to the war the gyrations recorded last week would have been accepted as signals that the advance was at an end. But the margins now exacted are so heavy and the accrued, but unrealized, profits on the stocks held are so large that the shock absorbing power of the market is great, and it may be possible to revive the speculative fire that was smothered for a time by declines from 10 to 50 points in some of the high-priced specialties.

But this possibility should not blind one to the fact that sentiment or psychological influences are uppermost at present and that those who would rather be safe than sorry will be wise in putting their profits on ice.

Meantime it must be admitted that, without being excited, the country's business is satisfactory.

The commodity markets have changed but little. Wheat has been almost at a standstill, with the strength in the domestic cash position offsetting bearish news from abroad. Corn is dull and slightly weaker.

Cotton has been waiting upon the next government report due on Monday, but the dry-goods trade is in a healthy condition, and it seems probable that manufacturers will buy raw cotton freely on any decline that may follow a further enlargement of the official crop estimate.

What's Doing in Industry

Current reports from the important industrial centers of the country show that business is running along smoothly, fair increases in demand and new inquiries coming at a rate that is decidedly encouraging. There is unmistakable evidence that the machine tool business is in better condition this fall than it has been at any time in the year so far.

Detroit again comes to the fore with a week of good business, the automotive industry being the best customer. Cincinnati also reports an increased demand, both in sales and new inquiries. Orders are coming from practically all sections of the country. In Chicago the demand has been well maintained, with the closing of good orders from railroad sources.

In the Southern district sales have kept pace with the better industrial conditions prevailing, and in Philadelphia the market has shown signs of picking up this fall. New York continues to show a steady volume of sales, with industrials leading in buying. October figures, just compiled, show that Milwaukee has had one of the best months in its history, and the outlook is exceedingly bright for the remainder of the year.

In the business world opinions differ only as to the degree of prosperity that is indicated by general conditions. Industrials are busy, commodity markets are strong and the public is buying freely but conservatively.

The American steel and iron industry is said to be working at 80 per cent of its capacity, but the fact that about 80,000 tons of British iron were sold in the United States within the last few weeks would seem to indicate that prices are about as high as they are likely to go. Lead, tin and zinc show but little change, but copper is a shade weaker.

The anthracite coal strike and the consequent famine that is said to threaten are being energetically advertised, but there are many who believe that the predicted scarcity is more imaginative than real.

Insofar as European conditions affect American business it cannot be said that they are much changed.

A total of about $25,000,000 in gold appears to have been shipped from England. Further large shipments in the near future, however, are not likely, as commercial interest rates in London are higher, and sterling exchange has advanced to $4.84⅛, at which price there is no profit in exporting gold to the United States. Meantime an outflow of gold from this country to Canada has started and has already reached a total of $7,000,000. This is purely a seasonal phenomenon due to heavy purchases of Canadian wheat by American mills.

The influence of the gold imports from England is reflected in the Federal Reserve report issued last Thursday. Total gold holdings have increased $12,000,000, and the combined reserve ratio of the twelve banks is up to 72.6 per cent as against 71.7 per cent for the preceding week.

The French franc has sold as low as 4.31¼. The difficulty that the French government has encountered in disposing of its 4 per cent gold *rentes* would indicate that a capital levy may have to be resorted to, if inflation that will be destructive of the nation's credit is to be avoided.

As to the business outlook in this country, opinions differ only in regard to the degree of prosperity that is indicated.

It is announced that the American public paid $1,183,000 to see the seven games of baseball in the World Series just ended, and it is estimated that nearly as much was collected from those who witnessed the football games played on Oct. 17. This expenditure would seem to indicate that the nation's purchasing power is unimpaired and that people can buy what they want when they want it. Therefore the future is largely a question of when the buying mode will pass.

The Industrial Review

Progress of the machinery and machine-tool business in various parts of the country

THE following reports, gathered from the various machinery and machine tool centers of the country, indicate the trend of business in these industries and what may be expected from the future:

Detroit

Very active. These two words describe the market for machinery and machine tools in Detroit and southeastern Michigan. Dealers in the field report a little increase over the past fortnight, with every indication that the fall and early winter months will find sales totals running far ahead of last year.

Some of the larger representatives of machinery manufacturers declare that they are behind five months in actual deliveries on some of their machines, while others are now taking orders for equipment to be delivered next February.

Engineers in the automobile plants are centering much of their time on the rearrangement of the cylinder departments. There appears to be an unusual demand for cylinder finishing equipment.

The Hudson Motor Car Co. is still included in the ranks of heavy buyers. Packard is proving a more active market than for some time past. The Ford Motor Co. is purchasing equipment for its River Rouge plant. Ford recently established a new daily production figure of 8,165 cars, but this figure is expected to be surpassed within another week as engineers expect a daily production exceeding 8,500 cars.

While Dodge Brothers have bought most of their gear equipment, and hammers and furnaces for the drop forge department, many of the orders for other machinery which will be installed in the new units now under construction have yet to be placed.

Orders for special machinery and equipment totaling nearly three million dollars have been and are being placed to build the new "Pontiac Six" of the General Motors Corporation which will be built at the plant of the Oakland Motor Car Co. at Pontiac. Something like 20 per cent of the new equipment has already arrived and is being installed. Seventy-five tool designers have been engaged since early in June, drawing up plans for the new machinery, tools and special equipment, and 125 more men have been engaged in rearranging the layout of the factories for the production of the new car. Five hundred new machines have been ordered as part of the additional equipment necessary to build the engine alone. First production of the new cars will be handled on an assembly line paralleling the present Oakland assembly. Additional assembly lines will be placed in operation as production gets under way.

Cincinnati

The majority of Cincinnati machine tool manufacturers report an increased demand in the past week and state that they regard the outlook as decidedly encouraging. Sales agents report that the market has a much better tone, that there is less sales resistance and that purchasers are making their decisions more quickly.

Orders and inquiries, it is stated, have been evenly distributed over different sections of the country, and the demand has been well equalized in respect to sizes and types of tools purchased. An increased number of inquiries have come from the electrical trades, and a livelier market in this field is expected.

A large number of the manufacturers and sales agents report a good volume of orders from the automotive industries and from manufacturers of automobile accessories. More inquiries are reported from the textile manufacturers.

Orders are beginning to come in from the oil fields, especially from the Oklahoma district, where several sales are reported.

Basing their opinions on the present upward business trend in all sections of the country, and on the increasing number of inquiries coming in, machine tool manufacturers and selling agents are freely predicting that there will be substantial business increases in November.

Philadelphia

Preparations for an active fall business were under way in machinery and machine tool producing establishments in Philadelphia this week. The announcement that the Norfolk & Western R.R. had sent out a list showing the prospective purchase of eighty-three machines, and inquiry from the Reading Co. of the need of cranes for its machine shop at Reading, Pa., were the chief factors which gave the producers here the belief that their earlier hopes for an active business were justified.

Jobbers report a better outlook for new business now than at any time in more than a year, and dealers in used machinery are likewise in a hopeful frame of mind.

The encouraging news from Europe that industries abroad soon will be placed upon a substantial basis gave hope to the concerns which do a foreign business.

Milwaukee

October is going on record as one of the best months of this year in respect to sales of metalworking equipment. As the period comes to a close the impressions of the trade are that active business will continue for some time. The improvement in demand has not taken a sudden spurt, for it has been steady and without the usual reverses that have been following increased demands of greater or lesser duration. It is exactly this development that has given the trade the encouragement it now feels regarding conditions.

In the local field, probably the heaviest buyer is the A. O. Smith Corporation, which as yet has filled only a part of its large needs for a huge plant addition that will be used mainly for the production of gasoline cracking stills and oil pipe line specialties of the welded type. The Ajax Motors Co. of Racine, Wis., is inquiring for a large list of production equipment, and its parent, the Nash Motors Co., is in the market for additional tools for the Kenosha as well as the Milwaukee works. The Seaman Body Corporation, at Milwaukee, an affiliated concern, is doubling its factory and equipment.

Some of the larger concerns building prime movers, heavy machinery, etc., like the Allis-Chalmers Manufacturing Co., the Nordberg Manufacturing Co., the Bucyrus Co. and others are displaying greater interest in equipment. Most of these shops have been doing little beyond replacements and the fact that they are figuring on extensions is regarded as an excellent sign bearing out the reports of increasing business for foundries and machine shops.

Southern District

Machine tool and equipment business in the Southeastern states has continued to note a fair degree of improvement the past two or three weeks, sales for the first half of October running quite a bit better than the corresponding period in 1924, and also showing an improvement over business the last half of September. The outlook is regarded by the dealers in this district as very good, as inquiries at present are unusually active, giving promise that there will be good machine tool and equipment buying through the fall and well into the winter. In fact, because general business conditions in this section are more favorable than they have been in years, dealers believe the machinery and equipment outlook to be as bright as it has been for this period in the past five or six years.

During September sales of tractors and power farming equipment continued to make steady gains over last year, these sales the last seven months approximating 50 to 55 per cent better than the same period in 1924. It is now virtually certain that 1925 will prove the biggest year in the history of power farming equipment business in the South.

Railroad business also is still fairly active, as several of the larger Southern roads still have important shop and terminal construction projects under way.

New York

Buying of machine tools and shop equipment continues along conservative lines in this market. Inquiries have increased, also, the demand coming in many instances from sources that have not been in the market for some time.

The total business for October has been better than September, in many cases firms reporting that business doubled over the previous month. Even though most sales were for individual machines, the number of single orders was enough to make a substantial gain.

There has been a good deal of price discussion hereabouts for the past month, some venturing the opinion that mounting production costs would necessitate advances in some lines. But so far there have been few changes and these have all been brought about by conditions beyond the control of production departments.

Industrialists prove to be the best customers, many lines of industry placing orders for machines.

Chicago

Continued and well maintained activity in the Chicago machine tool market is reported by dealers and manufacturers. Railroads have apparently closed on most of the bids asked for in the line of machine tools, recent inquiries from this source being negligible. It is not expected that much additional business for railroad shop equipment, with the exception of that recently reported from Florida, will be in prospect until budgets for 1926 requirements are prepared and submitted.

Large dealers in machinists' tools and accessories for industrial manufacturing plants report sales for September as in excess of the same month for several years, from which fact they augur a steadily sustained demand for several months to come.

The automotive industry continues to inquire for new equipment needed to meet increased production, practically all the big plants turning out automobiles and motor trucks being operated to capacity at this time. Farm implement makers are experiencing an unusually good demand for their products, and are in the market for machine tools of various descriptions.

Personals

FRED A. GEIER, president of the Cincinnati Milling Machine Co., has been elected president of the Cincinnati Rubber Manufacturing Co., of Norwood, succeeding the late F. D. Scherl.

JOHN A. CAMM has resigned as general sales and advertising manager for the W. F. & John Barnes Co., of Rockford, Ill.

D. HARDER has been appointed factory manager for the California plant of the Durant Motors Co.

G. R. SCOTT has been appointed assistant general manager of production for the Flint Motor Co., Flint, Mich.

J. J. CARTER has been appointed factory manager for the Olds Motor Works.

CHARLES P. PERIN, of Perin & Marshall, announces that he has organized a company to engage in the manufacture of electrolytic iron on a quantity basis.

C. G. KELLOG has been placed in charge of the sales and development departments of the Equipment Manufacturing Co., of Cleveland.

J. J. HORRAN has been appointed purchasing agent for the Pratt & Whitney Co., of Hartford, Conn. He succeeds O. P. Palmer, who resigned.

DAVID AYR has been appointed factory manager for the Pratt & Whitney Co., Hartford, Conn.

W. L. POYNTER has joined the sales force of the Black & Decker Manufacturing Co., and will be located at the Kansas City branch under the direction of J. N. LaBelle, branch manager. Mr. Poynter fills a vacancy made by the promotion of A. D. Gieger from that position to manager of the Boston branch.

A. G. HERTZLER, for many years associated with the Bearings Co. of America, of Lancaster, Pa., and more recently with the steel industry in California, has become associated with the sales department of the Pacific Sheet Steel Corporation, of San Francisco, California.

RICHARD COLLINGS has recently joined the sales force of the Bridgeport Brass Co., to cover the Michigan, Buffalo, Ohio and Pittsburgh territories.

News of the Automotive Industry

The Republic Motor Truck Co., Inc., has completed plans for the manufacture of motor buses at its Cleveland plant, according to O. W. Hayes, president of the company. He said that since 1913 the Republic Motor Truck Co. has produced 67,169 trucks, of which 42,000 are still in operation.

Production has been started on a six-cylinder line of Star cars which, it is understood, will sell for under $1,000.

Production of the new Hupmobile six is at the rate of approximately 100 cars a day. President Charles D. Hastings of Hupp Motors says: "We feel that this six will open up to Hupmobile a vast new market. Our plans for the car are the most comprehensive we have ever attempted. Output of both the six and eight during coming months will be higher than ever before. Our plans for 1926 call for the largest manufacturing operations in our history. New machinery installed, buildings rearranged for greater output and additional productive space will enable us to raise our production next year to new records."

The Cadillac Motor Co.'s September production broke all records in number of engines, chassis and completed cars built. September sales were 68 per cent greater than in the same month last year, while deliveries to dealers were 55 per cent higher.

The Paige-Detroit Motor Car Co. is planning for production next year of at least twice as many Paige cars as in 1925. August and September, with an output of 4,660 and 4,200 Paige and Jewett cars, doubled the figures for corresponding months last year.

Following a survey of its dealer organization which indicated a much greater demand than has heretofore been anticipated, the Buick Motor Car Co. has decided to keep production at full speed for the balance of this year. In September the company built 22,000 cars. October and November schedules are expected to exceed September.

From a volume standpoint the production of automobiles in the United States and Canada, taken together, stands alone when attempts at comparison with the other producing countries of the world are made, according to the automotive division of the Department of Commerce. Collectively, these other countries do not produce a tenth as many cars and trucks as come annually from American factories. Figures bear out this statement when it is shown that during 1924 there were 3,640,108 cars and trucks produced in American factories, in contrast with an estimated output of only 330,000 for the leading European producing nations of Great Britain, France, Italy and Germany.

A provisional agreement has been reached under which General Motors Corporation will control Vauxhall Motors. The plan provides for General Motors to put £300,000 of new working capital into the business and pay existing shareholders £210,000. The existing 600,000 10s common shares will be converted into 300,000 £1 six per cent cumulative preference, each shareholder receiving a cash payment for each share held. Management and general policy of Vauxhall Motors would remain the same. No dividend has been paid since 1919. Net profits the last two years were above £50,000.

It is stated on authority that there is no truth to rumors that Edsel Ford will become president of the Hudson Motor Car Co. On Aug. 13, Edsel Ford authorized a financial firm to make unqualified denial of reports that the Fords were heavily interested in Hudson. There has been no change in the situation since that time.

Brief Facts About Industry

The Singer Manufacturing Co. is not interested in the acquisition of the Remington Typewriter Co., according to the president of the Singer Manufacturing Co.

"We have never been interested in the company," says Sir Douglas Alexander. "We have had no thoughts nor ideas toward its acquisition. Neither the company nor the directors, so far as I know, have purchased any of the stock of the Remington Typewriter Co., and no purchases are being contemplated. We have no need for the Remington Typewriter Co. in our business. It is not a competitor, and is in an entirely different field."

Pig iron quotations in the South are taking an upward trend, small lot sales having been made at a base of $21 a ton. The average price of pig iron is now $19.50 to $20 with the latter level being held to by the larger producers. The sales made this month exceed the make, which further insures a steady reduction of surplus iron. Larger melters in the Southern territory have contracts in hand and in sight which will warrant active operation of plants for an indefinite period.

Cast iron pressure pipe shops of the Birmingham district report additional specifications, despite the fact that six-inch and over pipe has been advanced to $42 a ton, an advance of $1.

Steel mills of Tennessee Coal, Iron and Railroad Co. in Birmingham, Ensley and Fairfield, are well supplied with business, the rail mill in particular having orders which will warrant two and a half to three months operation.

Many bar mills are working full and deliveries are frequently delayed. Automobile manufacturers have continued heavy buyers of steel and the production schedules of a few have had to be increased. Building construction is on the increase and very substantial tonnages of structural material have been ordered in this district.

The American Sheet and Tin Plate orders for the past week are 100 per cent of capacity and no immediate interruption is foreseen.

Orders are pouring in on the mills in the Pittsburgh district, indicating a busy fall and winter. Several makers have advanced blue annealed to a 2.30-cent minimum and galvanized to 4.30 cents. This is an advance of $2 a ton respectively.

The September output of pig iron in Great Britain was 448,700 tons against 444,500 tons in August and an average monthly production of 609,900 tons in 1924. The output of steel ingots and castings was 638,900 tons against August total of 477,100 and monthly average last year of 685,100 tons.

Obituaries

MARTIN H. KENNEDY, superintendent of the foundry of the North & Judd Manufacturing Co., of New Britain, Conn., died in that city on Oct. 12, after a short illness. He had been associated with the North & Judd company for thirty-five years.

OLIVER TRANSUE, president of the Transue & Williams Steel Forging Corporation, of Alliance, Ohio, died in a Cleveland hospital on Oct. 19. Mr. Transue was a director in the Buckeye Twist Drill Co.

THOMAS F. MANVILLE, chairman of the board of directors of Johns-Manville, Inc., of New York, died suddenly on Oct. 20, of heart disease in his apartment at the Hotel Plaza. He was 63 years old.

Mr. Manville, who has occasionally been referred to as "the asbestos king," had for years been one of the foremost figures, if not the chief figure, in the asbestos and allied industries. He was for years the president of the Johns-Manville Co. and only changed his position to that of chairman of the board in March, 1924.

In addition to his connection with the Johns-Manville Corporation, he was also a director of several other corporations.

L. E. BRAYTON, for many years connected with the Chicago office of Manning, Maxwell & Moore, Inc., of New York, died suddenly in Salt Lake City on Oct. 23.

Business Items

The Chicago Pneumatic Tool Co. has effected arrangements with Motoren-Werke, Mannheim, Germany, whereby it has acquired the exclusive rights to manufacture and sell the Benz solid injection Diesel engine in the United States and Canada.

The general offices of Edgar T. Ward's Sons Co., formerly of Newark, N. J., have been removed to Pittsburgh, Pa.

The American Engineering Co., of Philadelphia, manufacturer of "Lo-Hed" hoists, Taylor stokers, Juruick ammonia compressors and other machinery, announces that its interests in Canada have been taken over by the Affiliated Engineering Companies, Ltd., with headquarters in the Southam Building, Montreal. This company has been organized by the merger of the Taylor Stoker Co., Ltd., of Montreal, and the Cleaton Co. (Canada), Ltd. M. Alpern, president of the American Engineering Co., is chairman of the board of the new company and F. S. B. Heward is president.

The R. S. Armstrong & Bro. Co., of Atlanta, for years one of the largest Southern distributors of used machinery and equipment, announces that the company has recently established a new department to handle exclusively high-grade machine tools. They are now representing in the Southeastern territory the Acme Machinery Co., the Cincinnati Milling Machine Co., the Cincinnati Bickford Co., the Cincinnati Planer Co. and the Lodge & Shipley Machine Tool Co.

The National Supply Co., of Toledo, Ohio, has arranged a demonstration of machine tools at its showrooms, St. Claire and Washington Sts., in Toledo. Several types of machine tools—including the products of the American Tools Works, the Barnes Drill Co., the Foote-Burt Co., the Monarch Machine Tool Co., the Wilmarth & Morman Co., and the Kempsmith Manufacturing Co.—will be shown under power in actual production work. The exhibition will run from Nov. 9 to 14.

Pamphlets Received

Machinist's Practical Guide. Published by the Morse Twist Drill & Machine Co., Mass. This booklet is a small 48-page vest-pocket handbook of information useful to machinists. The tables of information include taper sizes, drill speed and feed and gages, cutting speeds for milling, thread standards and mathematical tables. Iron and steel sizes and weights are also listed according to their various forms.

Boiler Room Operation, Steel and Its Treatment, and Ceramics, are the names of three series of articles by G. F. Gebhardt, H. M. Boylston and C. W. Parmelee respectively, and published by the Republic Flow Meters Co., 2240 Diversey Parkway, Chicago, Ill. At present there are five articles under each heading dealing with different subjects in their particular fields. They are all published separately in folder form.

Monel Metal and Nickel Buyers' Guide. Published by the International Nickel Co., 67 Wall St., New York, N. Y. This directory alphabetically lists those companies who manufacture Monel-metal and nickel products. The directory is also classified according to products and is extracted from the 1925 and 1926 editions of Thomas' Register of American Manufacturers and Hendricks' Commercial Register of the United States.

Trade Catalogs

Bearing Metal. Bearium Bearings, Inc., Endicott Sq., Buffalo, N. Y. An eight-page booklet has been prepared to describe Bearium metals as applied to castings, bars and gears in blank or finished form. The advantages of the metal are described as well as the applications. The physical properties of five grades of the metal are listed in a table.

Blowers and Fans. The American Blower Co., Detroit, Mich., has published Bulletin No. 6103 to describe the American H. S. Fans. The booklet, thirty-two 8½x11-in. pages, discusses the general features of design and the construction of the parts that are used in this equipment. Many illustrations are included with the descriptive material and tables show the specifications and capacities of the fans the dimensions being defined by line drawings.

Capacity tables based on tests run in accordance with the Standard Test Code of the National Association of Fan Manufacturers and the American Society of Heating and Ventilating Engineers are given.

Blowers and Fans. Allen & Billmyre Co., 730 Grand Central Palace, New York, N. Y. Bulletin No. 130, a four-page circular giving in condensed form illustrations and a description of the details of construction of the Tabco blowers and exhausters. Both large and small models are included.

Electric Equipment. The Holtzer-Cabot Electric Co., Boston, Mass., has published "Fifty Years, 1875-1925" in commemoration of its fiftieth anniversary. The book contains forty-eight, 9x12-in. pages that are artistically prepared and the material of which is well arranged. There is a history of the company's growth and development written up in the first seventeen pages and photographs of the plant, personnel and activities receive a similar amount of space. The remainder of the book is devoted to comparative illustrations of modern and antiquated motors and electrical appliances.

Electric Drills. The Hisey-Wolf Machine Co., Cincinnati, Ohio. Bulletin No. 108 is devoted to the new ¼-in. and ⅜-in. Hisey universal drills equipped with the standard Hisey motor. A phantom view of the motor shows the construction details which are given short paragraph descriptions.

Electric Heating Ovens. Automatic & Electric Furnaces Ltd., 173-175 Farringdon Road, London, England. Catalog G illustrates and describes the Wild-Barfield line of electrically heated industrial ovens and equipment. These may be equipped with the usual apparatus for thermostatic pyrometer or time-switch control.

Milling Machines, Automatic. The Bilton Machine Tool Co., Bridgeport, Conn. "Miles of Milling" is the title of an 8-page circular that discusses the type and range of work for which the Bilton Pro-Ducto-Matics are applicable. The bulletin goes into some detail and a photograph shows a group of parts produced on these machines.

Electric Motors. Electric Machinery Manufacturing Co., Minneapolis, Minn. Bulletin No. 812 describes the E-M synchronous motors of types designed for belted installations. There are many illustrations of the motors and parts and a full description covering eight 8½x11-in. pages.

Squaring Shears. Niagara Machine & Tool Works, Buffalo, N. Y. The Niagara line of power squaring shears is the subject of a folder that also touches on other machines for sheet-metal working.

Power and Shaft Equipment. The A. & F. Brown Co., Elizabethport, N. J., has prepared a bulletin briefly describing its line of pulleys, shafting, clutches and adjustable shafting hangers.

Small Tools. Greenfield Tap and Die Corporation, Greenfield, Mass. Catalog No. 49 has been published to cover the complete line of tools manufactured by this company. The catalog with three hundred eighty-four 5x7¼-in. pages, includes the ground-thread taps and spiral-fluted stay-bolt taps, bolt and threading machines, as well as its complete line of gages. Each type of drill, reamer or tool is illustrated and the prices accompany each size in the list.

The section devoted to tables is seventy-five pages in length and includes a glossary for screws and threads, tap tolerances, basic thread dimensions with drill sizes, taper sizes, cutting speeds and tables of decimal equivalents for several standards as well as other information.

The catalog is compact, well prepared and useful.

Work Benches. Standard Pressed Steel Co., Jenkintown, Pa. Form No. 340 is a folder describing the "Hallowell" work bench for the small shop or for home use. Specifications and illustrations are also given.

Pressed Steel. The Youngstown Pressed Steel Co., Warren, Ohio. "Adventures in Redesign" is a twenty-three page booklet describing the development of pressed steel methods and giving many examples where pressed steel parts have been substituted for castings.

Drills. The Morse Twist Drill & Machine Co., New Bedford, Mass., has published a series of folders, form No. 1A on Morse adjustable reamers for carbon and high-speed steel; No. 2A, describing several styles of drills, reamers and taps; No. 3A, describing the "handy radio drill set, No. 3"; No. 4A on combined drills and countersinks; No. 5A on the No. 392 wood drills for braces; and another on the No. 385 machine wood bit.

Milling Machines, Automatic. Brown & Sharpe Manufacturing Co., Providence, R. I. A 46-page catalog has been issued to describe the Nos. 21 and 33 automatic machines for light and heavy milling. The 8½x11-in. pages contain many close-up views of working parts of the machines as well as detailed descriptions. Representative operations on which the machines have been used are given considerable space with illustrations of both the machines and the jobs produced.

Stokers. American Engineering Co., Philadelphia, Pa. A large catalog, sixty-five 9x11-in. pages has been published to describe the Taylor stokers. The catalog includes a section on the use of pre-heated air for which a type of Taylor stoker has been developed, and a description of the ram system used in these stokers. There are photographs of the equipment in the Weymouth Station of the Boston Edison Co., the Kearney Station of the Public Service Corporation of New Jersey and others. The illustrations are many and large and the design of the catalog is artistically executed.

Tool Steel. The Columbia Tool Steel Co., Chicago Heights, Ill., has published a handbook on the use and handling of tool steels together with data and information. The information covers the machining, forging, annealing and hardening of the steels as well as the grinding of the several brands of Columbia steels.

A section of tool-steel hints is included in this 62-page book to deal wtih the heat-treatment and heat-treating equipment in addition to a discussion of hardness testing instruments and equipment.

The stock sizes, weights and prices of the steel are listed and useful mathematical tables given.

Calendar of Local Meetings

National Association of Cost Accountants

New York Chapter. Nov. 10. "The Elements of Standard Costs," by G. Charter Harrison.

Albany Chapter. Nov. 11. Description of manufacturing methods and discussion of general accounting scheme and accounting methods.

Worcester Chapter. Nov. 12. "Mechanical Appliances—Their Uses and Costs."

Philadelphia Chapter. Nov. 13. "Relation of Sales Quotas and Credits to Production and Costs," by J. W. Hallman.

Mohawk Valley Chapter. Nov. 16. "Materials Budget, or Costing the Materials."

American Society of Mechanical Engineers

Hartford. Nov. 3. Hartford Engineers' Club. Subject: "Production Problems in Fire Arms Manufacture." E. D. P. Gross, secretary, Hartford Electric Light Co.

Metropolitan. Nov. 12. Engineering Societies Building. Subject: "Subterranean Heat as a Source of Energy." Speakers: L. P. Breckenridge, George Otis Smith and J. D. Galloway.

Los Angeles Chapter. Nov. 17. "Recording the Unrecorded Cost," by E. C. D. Price and H. H. Baskerville.

Cleveland Chapter. Nov. 18. "Business Forecasts and Labor Control and Distribution."

Pittsburgh Chapter. Nov. 18. "Cost and Budget Systems for Public Education," by Dr. Frank Haas.

Rochester Chapter. Nov. 18. "The Elimination of Clerical Work by Simplified Cost Finding," by C. H. Scovell.

Syracuse Chapter. Nov. 18. "Questions the Executive Expects the Cost and Accounting Department to Answer," by F. L. Sweetster.

Boston Chapter. Nov. 19. "Reducing Inventory Investment Through Turnover," by Clifford B. Wright.

Buffalo Chapter. Nov. 19. "The Cost of Collections."

Chicago Chapter. Nov. 19. "Planning for Future Financial Position," by F. M. Kasch.

San Francisco Chapter. Nov. 23. "Cost Accounting in the Printing Trades."

Detroit Chapter. Nov. 28. "Methods of Taking Inventories."

Forthcoming Meetings

American Institute of Steel Construction. Annual convention, White Sulphur Springs, W. Va., Nov. 11 to 14. C. F. Abbott, executive secretary, 350 Madison Ave., New York City.

National Founders' Association. Annual Convention, Hotel Astor, New York, Nov. 18 and 19. J. M. Taylor, executive secretary, 29 So. La Salle St., Chicago.

American Society of Mechanical Engineers. Annual meeting, Engineering Societies Bldg., 29 West 39th St., New York City, Nov. 30, to Dec. 4. Calvin Rice, secretary, Engineering Societies Bldg., New York.

National Exposition of Power and Mechanical Engineering. Fourth annual event, Grand Central Palace, New York City, Nov. 30 to Dec. 5. Charles F. Roth, manager, International Exposition Co., Grand Central Palace, New York City.

American Association for the Advancement of Science. Annual meeting, Kansas City, Mo., Dec. 28, 1925, to Jan. 2, 1926. Burton E. Livingston, secretary, Smithsonian Institute Bldg., Washington, D. C.

American Society for Steel Treating. Winter sectional meeting, Hotel Statler, Buffalo, N. Y., Jan. 21 and 22. W. H. Eisenman, secretary, 4600 Prospect Ave., Cleveland, Ohio.

The Weekly Price Guide

Rise and Fall of the Market

Iron and Steel—Pig iron quotations show little change from from last week's levels; buying continues in substantial volume, but for delivery in near future, owing to uncertainty of fuel prices; much foreign iron coming in. Scrap prices are rising. Demand is active in the current market for steel rails, fabricated structurals, tank plates, and wire products. Steel sheets are slow. The principal hot rolled products are selling as follows: bars, $2; shapes, $1.90@$2; plates, $1.80@$1.90 per 100 lb., Pittsburgh mill.

Non-Ferrous Materials—The general trend in this class is upward. Comparing the present market with Oct. 16 the following is noted: tin is up 2½c. per lb. in New York; antimony ½c. in Cleveland and 1c. per lb. in New York; solder, 2c. and babbitt metal, 1½c. per lb. in Cleveland; zinc sheets, 0.1c. per lb. in Chicago.

(All prices as of Oct. 23)

IRON AND STEEL

PIG IRON—Per gross ton, f.o.b.:

CINCINNATI	
No. 2 Southern	$23.05
Northern Basic	22.27
Southern Ohio No. 2	22.77
NEW YORK—Tidewater Delivery	
Southern No. 2 (silicon 2.25@2.75)	27.37
BIRMINGHAM	
No. 2 Foundry	20.00
PHILADELPHIA	
Eastern Pa., No. 2x (silicon 2.25@2.75)	22.26
Virginia No. 2	29.17
Basic	21.16
Grey Forge	.....
CHICAGO	
No. 2 Foundry local	22.00
No. 2 Foundry, Southern (silicon 2.25@2.75)	25.55
PITTSBURGH, including freight charge ($1.76) from Valley	
No. 2 Foundry	20.77
Basic	20.77
Bessemer	20.77

IRON MACHINERY CASTINGS—Cost in cents per lb. of 100 flywheels, 6-in. face x 24-in. dia., hub not cored, good quality gray iron, weight 275 lb.:

Detroit	5.00@5.50
Cleveland	4.90@5.00
Cincinnati	5.00@7.50
New York	5.00@5.50
Chicago	5.25@5.75

SHEETS—Quotations are in cents per pound in various cities from warehouse; also the mill base in large lots.

Blue Annealed	Pittsburgh Mill Base	New York	Cleveland	Chicago
No. 10	2.25@2.30	3.89	3.00	3.50
No. 12	2.30@2.35	3.94	3.05	3.55
No. 14	2.35@2.40	3.99	3.10	3.60
No. 16	2.45@2.50	4.09	3.20	3.70
Black				
Nos. 17 to 21	4.00	4.15	3.60	3.80
Nos. 22 to 24	4.05	4.20	3.65	3.85
Nos. 25 and 26	4.10	4.25	3.70	3.90
No. 28	4.20	4.35	3.80	4.00
Galvanized				
Nos. 10 and 11	2.05@2.15	4.35	4.00	4.00
Nos. 12 to 14	2.15@2.25	4.45	4.10	4.10
No. 16	2.30@2.40	4.60	4.25	....
Nos. 17 to 21	2.45@2.55	4.75	4.40	4.40
Nos. 22 to 24	2.60@2.70	4.90	4.55	4.55
No. 26	2.75@2.85	5.05	4.70	5.70
No. 28	3.05@3.15	5.35	4.95	4.00

WELDED STEEL PIPE—Warehouse discounts are as follows:

	New York Black	New York Galv.	Cleveland Black	Cleveland Galv.	Chicago Black	Chicago Galv.
1 to 3 in. steel butt welded	53%	39%	55½%	43½%	54%	41%
3½ to 6 in. steel lap welded	48%	35%	53½%	40½%	51%	38%

Malleable fittings: Classes B and C, banded, from New York stock sell at list plus 4% less 5%. Cast iron, standard sizes, 36-5% off.

Size, Inches	List Price per Foot	Diameters Inches External	Diameters Inches Internal	Thickness Inches
1	$0.17	1.315	1.049	.133
1¼	.23	1.66	1.38	.14
1½	.27½	1.9	1.61	.145
2	.37	2.375	2.067	.154
2½	.58½	2.875	2.469	.203
3	.76½	3.5	3.068	.216
3½	.92	4.0	3.548	.226
4	1.09	4.5	4.026	.237
4½	1.27	5.0	4.506	.247
5	1.48	5.563	5.047	.258
6	1.92	6.625	6.065	.28

SEAMLESS STEEL TUBING—Following base discounts are on 20 gauge or .035-in., round, cold-drawn tubing, ½-in. to 1-in., O.D., weighing 0.17 lb. to 0.36 lb. per ft. Cutting charge per 100 cuts, $1.50 to $1.58:

O.D. Inches	List Price per ft.	Differential Discount	O.D. Inches	List Price per ft.	Differential Discount
½	$0.15	50%	⅞	$0.18	35%
⅝	.16	45%	1	.19	31%
¾	.17	40%			

NOTE—The discounts are to be lowered by the following differentials in the case of regular .10-.30 carbon: 25,000 ft. or over, 83; 15,000 to 25,000 ft., 82; 5,000 to 15,000 ft., 81; 1,000 to 5,000 ft., 80; less than 1,000 ft., 79.

MISCELLANEOUS—Warehouse prices in cents per pound in 100-lb. lots:

	New York	Cleveland	Chicago
Open hearth spring steel (base)	4.00	....	4.00@4.65
Spring steel (light) (base)	7.00	6.00	6.00
Coppered Bessemer rods (base)	6.05	....	....
Hoop steel	4.49	3.85	4.15
Cold rolled strip steel	6.35	8.25	6.80
Floor plates	5.55	5.60	5.50
Cold drawn shafting or screw	4.15	3.80	3.60
Cold drawn flats, squares	4.65	4.30	4.10
Structural shapes (base)	3.34	3.20	3.10
Soft steel bars (base)	3.24	3.10	3.00
Soft steel bar shapes (base)	3.24	3.11	3.10
Soft steel bands (base)	3.99	3.20	3.65
Tank plates (base)	3.34	3.40	3.10
Bar iron (3.00 at mill)	3.24	3.21	3.00
Drill rod (from list)	60%	55%	60%

Electric welding wire, New York, 3/32, 8.25c.; ⅛, 7.85c.; 5/32 to ¼, 7.35c. per lb.

METALS

Current Prices in Cents Per Pound

Copper, electrolytic (up to carlots), New York			15.25
Tin, 5-ton lots, New York			66.00
Lead (up to carlots) E. St. Louis	9.30	New York	10.25
Zinc (up to carlots) E. St. Louis	8.50	New York	9.25

	New York	Cleveland	Chicago
Antimony (Chinese), ton spot	19.50	20.25	....
Copper sheets, base	22.75	22.75	22.75
Copper wire, base	20.25	17.00	16.75@17.00
Copper bars, base	21.87½	21.50	21.87½
Copper tubing, base	24.75	25.50	24.75
Brass sheets, base	19.12½	19.00	19.12
Brass tubing, base	23.75	23.75	23.75½
Brass rods, base	16.87½	16.87½	16.87
Brass wire, base	19.62½	22.50	19.62½

Shop Materials and Supplies

METALS—Continued

	New York	Cleveland	Chicago
Aluminium ingots, 98 to 99%, 1–15 ton lots	28.00	28.00	28.03
Zinc sheets (casks)	11.25	12.00	11.87
Solder (½ and ½), (case lots)	39.50	41.00	38@42
Babbitt metal (83% tin)	60.00	72.50	58@63
Babbitt metal (35% tin)	28.00	22.50	30@35
Nickel (ingots) f.o.b. refinery	31.00	.....	.....
Nickel (electrolytic) f.o.b. refinery	38.00	.....	.....
Nickel (shot) f.o.b. refinery	32.00	.....	.....

SPECIAL NICKEL AND ALLOYS—Price in cents per lb., f.o.b. Huntington, W. Va.:

Hot rolled nickel sheet (base)	52.00
Cold rolled nickel sheet (base)	60.00
Hot rolled rods, Grade "A" (base)	50.00
Cold drawn rods, Grade "A" (base)	58.00
Manganese nickel hot rolled rods "E"—low manganese (base)	54.00
Manganese nickel hot rolled rods "D"—high manganese (base)	57.00

Base price of Monel metal in cents per lb., f.o.b. Huntington, W. Va.:

Shot	32.00	Hot rolled rods (base)	40.00
Blocks	32.00	Cold drawn rods (base)	48.00
Ingots	38.00	Hot rolled sheets (base)	42.00
Cold rolled sheets (base)			50.00

OLD METALS—Dealers' purchasing prices in cents per pound:

	New York	Cleveland	Chicago
Crucible heavy copper	12.50@12.75	11.50	12.00@12.50
Copper, heavy, and wire	12.00@12.25	11.25	11.50@12.00
Copper, light, and bottoms	10.00@10.50	9.50	10.25@10.75
Heavy lead	8.00@8.75	7.50	7.75@8.25
Tea lead	6.75@7.25	4.50	6.50@7.00
Brass, heavy, yellow	7.50@7.75	7.00	7.75@8.25
Brass, heavy, red	9.75@10.12½	....	8.75@9.25
Brass, light	6.25@6.50	6.00	7.25@7.75
No. 1 yellow rod turnings	8.25@8.75	9.25	7.50@8.00
Zinc	4.75@5.50	4.25	4.50@5.00

TIN PLATES—American Charcoal—Bright—Per box

		New York	Cleveland	Chicago
"AAA" Grade:				
IC,	14x20	$11.25	$11.45	$11.50
"A" Grade:				
IC,	14x20	8.85	9.40	9.50
	Coke Plates—Primes.			
100-lb.,	14x20	6.50	6.10	7.00
	Terne Plates—Small lots, 8-lb. Coating			
IC,	14x20	7.25	6.95	7.50

MISCELLANEOUS

	New York	Cleveland	Chicago
Cotton waste, white, per lb.	$0.15@0.22	$0.19	$0.20
Cotton waste, colored, per lb.	.10@.15½	.18	.17
Wiping cloths, washed white, per lb	.17½	36.00 per M	.15½
Sal soda, per 100 lb. keg	2.25	2.25	2.75*
Roll sulphur, per 100 lb. keg	3.75	3.75	4.50
Linseed oil, per gal., 5 bbl. lots	1.04½	1.15	1.01
Lard cutting oil, 25% lard, per gal.	.55	.50	.72
Machine lubricant, medium-bodied (50 gal. wooden bbl.), per gal.	.35	.35	.26
Belting—Present discounts from list in fair quantities (½ doz. rolls).			
Leather—List price, 24c. per lin. ft. per inch of width for single ply.			
Medium grade	40%	40%	30–10%
Heavy grade	30–10%	35%	30–5%
Rubber transmission, 6-in., 6 ply, $1.83 per lin. ft.			
First grade	50%	50–10%	50%
Second grade	50–10%	60–5%	50–10%

*In 175 lb. kegs.

Comparative Warehouse Prices

New York	Unit	Current Price	Four Weeks Ago	One Year Ago
Soft steel bars	per lb.	$0.0324	$0.0324	$0.0324
Cold drawn shafting	per lb.	.0415	.0415	.0405
Brass rods	per lb	.1687½	.1687½	.1462½
Solder (½ and ½)	per lb.	.395	.395	.37@.38
Cotton waste	per lb.	.15@.22	.15@.22	14@21
Washers, cast iron (½ in.)	per 100 lb.	7.00	7.00	6.50
Emery, disks, cloth, No. 1, 6 in. dia.	per 100	3.55	3.55	3.38
Lard cutting oil	per gal.	.55	.55	.55
Machine oil	per gal.	.35	.35	.29
Belting, leather, medium	off list	40%	40%	40–2½%
Machine bolts up to 1x30 in.	off list	40%	40%	45%

MISCELLANEOUS—Continued

	New York	Cleveland	Chicago
Abrasive materials—In sheets 9x11 in., No. 1 grade, per ream of 480 sheets:			
Flint paper	$5.46	$5.84	$5.00
Emery paper	10.71	11.00	11.90
Emery cloth	29.48	31.12	32.75
Emery disks, 6 in. dia., No. 1 grade, per 100:			
Paper	1.49	1.41	1.40
Cloth	3.55	2.67	3.55
Fire clay, per 100 lb. bag		.60	.75
Coke, prompt furnace, Connellsville	per net ton		8.25@8.75
Coke, prompt foundry, Connellsville	per net ton		9.25@9.75
White lead, dry or in oil	100 lb. kegs		New York, 15.75
Red lead, dry	100 lb. kegs		New York, 15.75
Red lead, in oil	100 lb. kegs		New York, 17.25

SHOP SUPPLIES

Machine bolts, ¼x1½-in., per 100, $1.70. Discount at New York warehouses on all sizes up to 1x30-in., 40%; 1½ and 1¼x3-in. up to 12-in., 15%; with cold punched hex. nuts up to 1-in. dia. (plus std. extra of 10%) 30%; with hot pressed hex. nuts up to 1x30-in. (plus std. extra of 10%) 35%. Machine bolts, up to 1x30-in., with cold punched and hot-pressed hex. nuts, also button head bolts with hex. nuts are $3.60@3.75 per 100 lb at Cleveland

Carriage bolts, ¼x1½-in., per 100, $1.00. Discount on all sizes up to 1x30-in., 30%.

Coach and lag screws, 1½x⅜in., $2.25 per 100, less 40%.

Tap bolts, 1½x½-in., $1.00 per 100. List plus 35% at New York warehouses; with hex. heads, $4.65 per 100 lb. net at Chicago.

Bolt ends, 1x12-in., 10c. per lb., less 40%.

Nuts, semi-finished, ½x½-in., 2c. each. Discount 70% for ⅜-in. and smaller and 65% for ½-in. and larger.
Case hardened ½x½-in., 6c. each, less 50%.

Rivets, button heads, ½-in., ⅝-in., 1-in. diam.x2⅛-in. to 4½-in., $5.00* per 100 lb. at New York warehouses; cone heads, same sizes, $5.20* per 100 lb. Rivets, ⅞x1-in. and longer, 19c. per lb., less 50%. Same discount for tinned. EXTRA per 100 lb. for 1½ to 2-in. long, all diameters, 25c.; ½-in. dia., 35c.; ½-in. dia., 75c.; 1-in. long and shorter, 75c., longer than 5-in., 50c.; less than 200 lb., 50c.; countersunk heads, 45c.

Washers, cast iron, ½-in., $7.00* per 100 lb. at New York warehouses; ⅝-in., $6.00* per 100 lb.

*For immediate delivery from warehouse.

Machine Requirements and Industrial Construction

Machine Tools and Equipment Wanted

Ill., Chicago — Link-Belt Co., 300 West **Pershing Road—traveling crane and prob**ably large punches and shears to cut steel plates for proposed 1 story, 120 x 260 ft. **addition to steel shop.**

L. I., Jamaica—Tozgay Electric Welding Co., 14722 Archer Place, C. Tozgay, Purch. Agt. — portable flexible shafts, grinding equipment, ¼ hp., a.c. motors.

Mass., South Boston (Boston P. O.)—B. Stephens Sons, 113 A. St.—16 in. buzz planer, 24 to 30 in. single surface planer, 4 to 8 spindle wood boring machines, gap lathe, 36 in. metal boring machine, medium size shaper.

Mich., Detroit — Budd Wheel Corp., Charlevoix Ave.—equipment for the manufacture of hubs and wheels also conveying and handling equipment for loading dock.

O., Mansfield—Vitreous Enameling Co.—machinery for enameling plant.

Pa., West Middlesex—Sherman & Sherman—cylinder reboring machine, drill press, lathe.

S. C., Mullins—Mullins Lumber Co.—30 to 60 ft. electric traveling cranes, three motors 8 to 10 ton lifting capacity, 300 f.p.m. speed.

W. Va., Logan—Guyan Machine Shops—punch and shear for ½ in. plate stock.

Wis., Manitowoc — Aluminum Specialty Co., South 17th and Wollmer Sts.—special machinery for the manufacture of aluminum cooking utensils, etc.

Wis., Milwaukee—L. J. Mueller Furnace Co., 197 Reed St. (household furnace manufactures)—electric japaning oven.

Wis., Milwaukee—B. E. Nasnot, c/o R. E. Oberst, 128 Grand Ave., Archt.—sheet metal working machinery.

Ont., Wolf Lake—F. Farrell—complete machinery and equipment for saw mill.

Que., Montreal — A. Belanger, 687 Des Erables St.—drill press, small lathe and air compressor.

Que., Montreal—E. Carow, 3707 Boyer St. dovetailer and jointer.

Que., Montreal—G. Lebel, 201 Baley St.—(sash and doors) jointer and mortiser.

Que., Montreal—E. Magnaw, 271 Christopher Columbus St. (sash and doors)—mortizing machine and moulder.

Que., Montreal — J. O. Morin, 3915 St. Lawrence Blvd.—planer, matcher, etc.

Que., Montreal—N. Piorier, 591 Marie Anne St. E.—(cabinetmaker)—drum sander and wood lathe.

Que., Montreal—J. Therrian, 576 Ontario St. E.—drill, grinder and planer.

Australia, Melbourne—Victorian Government Railways, will receive bids until Nov. 25 for one lot of sawing machines including tools and accessories, 3 sets of air brake equipment and spares; until Dec. 16 for one plain horizontal milling machine complete with equipment, 1 set of drop hammer stamps of 10 and 5 cwt. complete with equipment.

Opportunities for Future Business

Ala., Chickasaw—The J. M. Card Lumber Co., F. B. Daune, Secy. and Mgr., Rosevale Blvd., plans the construction of a 1,000,000 ft. capacity lumber plant, saw mill, planing mill, dry kiln, etc., here.

Ark., Blytheville—Chicago Mill & Lumber Co., 500 North Dearborn St., Chicago, Ill., will build a lumber mill including sawmill, veneer mill, storage sheds, etc., to replace fire loss. Estimated cost $400,000.

Calif., Berkeley—Solano Iron Works, 3rd and Allston Way, will build a 1 story factory at 9th and Parker Sts. Estimated cost $20,000. Private plans.

Calif., Colfax—California State Highway Comn., Forum Bldg., Sacramento, plans the construction of a maintenance shop. Estimated cost $5,000. R. M. Morton, State Highway Engr.

Calif., Daly City—H. H. Smith, 215 Los Bamos St., is having plans prepared for the construction of a planing mill on San Bruno Ave. Estimated cost $5,000. Private plans.

Calif., Los Angeles—Bd. of Education, is having preliminary plans prepared for the construction of a 10 story Frank Wiggins Trade School on 16th St. between Hill and Grand Aves. Estimated cost $700,000. J. M. Austin and F. M. Ashley, Chamber of Commerce Bldg., Archts.

Calif., Los Angeles—Santee Garage Co., awarded contract for the construction of a 6 story, 100 x 160 ft. garage at Santee St. between 8th and 9th Sts. Estimated cost $360,000. Dodge & Burnett, 608 Lankershim Bldg., Archts. and Engrs.

Calif., San Francisco — J. Jerome, 321 Bush St., is having plans prepared for the construction of a 2 story garage at 3rd and Folsom Sts. Estimated cost $150,000.

Calif., Stockton—Klamath Lumber & Mill Work Co., Klamath Falls, Ore., is having plans prepared for the construction of a lumber manufacturing plant here, cost to exceed $10,000.

Conn., Hartford — The Connecticut Co., State St., awarded contract for the construction of a 1 story, 90 x 180 ft. motor bus garage on Washington St. Estimated cost $150,000.

Ill., Chicago—The Eagle Tank Co., 2426 North Crawford St., plans the construction of a new plant on recently acquired site at Kildare and Wellington Sts. Estimated cost $150,000.

Md., Baltimore—Kimball-Tyler Co., 261 South 8th St., awarded contract for the construction of a 1 story, 160 x 200 ft. cooperage shop. Estimated cost $60,000. Noted Sept. 3.

Mass., Braintree (Boston P. O.)—City Service Refining Co. awarded contract for construction of a 2 story, 54 x 100 ft. garage and repair shop at Quincy Ave., East Braintree. Estimated cost $45,000.

Mass., Cambridge (Boston P. O.)—Massachusetts Wharf Coal Co., 30 Kilby St., Boston, is receiving bids for the construction of a 1 story, 77 x 164 ft. garage and repair shop at Harvard and Main Sts. here. Estimated cost $50,000. W. E. Cotter, 12 Harvard St., Archt.

Mass., Lawrence—O. F. Kress Co., 102 Concord St., awarded contract for the construction of a 1 and 2 story repair shop and office building. Estimated cost $40,000. Noted Sept. 24.

Mass., Newburyport—Towle Mfg. Co., 260 Merrimac St., awarded contract for the construction of a 3 story, 32 x 100 ft. factory. Estimated cost $40,000. Noted Oct. 8.

Mass., Newtonville (Boston P. O.)—The Newton Screw & Machine Co., Crafts St., has work under way on the construction of a 1 story, 30 x 100 ft. machine shop at 227 California St., Newton. Estimated cost $10,000.

Mass., Quincy—A. Pomeo, 24 Curtis St., awarded contract for the construction of a 1 story, 75 x 180 ft. repair garage and service station. Estimated cost $55,000.

Mass., Roxbury (Boston P. O.)—Gateman & Yarchin, 43 Tremont St., Boston, will build a 1 story, 80 x 250 ft. repair and service garage at 3293 Washington St., here. Estimated cost $50,000. S. S. Eisenberg, 46 Cornhill, Boston, Archt. Noted Oct. 1.

Mass., Somerville (Boston P. O.)—The Underhill Bros. Tool Co., Cummins St., awarded contract for rebuilding part of its plant destroyed by fire. Estimated cost $7,500.

Mich., Detroit—A. Kahn, 1000 Marquette Bldg., Archt., will receive bids until Nov. 10 for the construction of a group of buildings for the manufacture of auto wheels including 2 story, 121 x 371 ft. press building, 3 story, 129 x 696 ft. hub building and 51 x 440 ft. unloading dock for Budd Wheel Corp., Charlevoix Ave.

Mich., Detroit—Hudson Motor Car Co., 12601 East Jefferson Ave., awarded contract for the construction of a 3 story, 84 x 580 ft. addition to press shop including craneway at Connors St. and Knodel Ave. Noted July 9.

Mo., St. Louis—The William Wurdack Electric Mfg. Co., has purchased a site at Clayton and Newstead Aves. and plans the construction of a new plant.

N. J., Camden—Acme Staple Co., 1643 Haddon Ave., plans the construction of a 2 story, 87 x 145 ft. addition to factory. C. E. Wunder, 1520 Locust St., Philadelphia, Pa., Archt.

N. Y., Coney Island (Brooklyn P. O.)—Bd. of Transportation, J. H. Delaney, Chn., will soon award contract for the construction of a main repair shop at Ave. X and Shell Road. Noted Oct. 15.

N. C., Durham—The Nash Motor Co., is having plans prepared for the construction of addition to garage building. Milburn Heister & Co., Union Savings Bank Bldg., Washington, D. C., Archts.

O., Akron — Akron Standard Mold Machine Co., Englewood Ave., awarded contract for the construction of a 1 story general machine shop in connection with factory. Estimated cost $50,000.

O., Mansfield — Vitreous Enameling Co. plans the construction of addition to factory. Estimated cost $40,000.

Okla., Tulsa—N. B. Fleming, 504 Bliss Bldg., Archt., is receiving bids for the construction of a 4 story, 100 x 140 ft. sales and service garage for P. J. Hurley, First National Bank Bldg. Estimated cost $150,000.

Pa., Blairsville — The Conemaugh Iron Works, is having plans prepared for the construction of a 1 story, 130 x 312 ft. foundry. Estimated cost $30,000. B. H. Prack, Martin Bldg., Pittsburgh, Engr.

Pa., Millvale—Bennett Lumber & Mfg. Co., plans the construction of a 1 and 2 story, 52 x 103 ft. planing mill on Sedgewick St. Estimated cost $50,000. F. H. Smart, 3418 Delaware Ave., Pittsburgh, Archt.

Pa., Philadelphia—Turner Machine Co., 3632 North Lawrence St., awarded contract for the construction of a 1 story, 72 x 91 ft. shop at 917-923 Schiller St. Estimated cost $20,000.

Wis., Kenosha — The Wisconsin Gas & Electric Co., Public Service Bldg., awarded general contract for the construction of a garage, service shop, warehouse and storage building in connection with local unit. Estimated cost $125,000.

Wis., La Crosse — Trane Co., 2nd and Cameron Sts., awarded contract for the construction of a 1 story, 80 x 115 ft. addition to factory for the manufacture of heating specialties. Estimated cost $45,000.

Wis., Madison—Ripp & Son Co., c/o F. Ripp, 1672 East Mifflin St., plans the construction of a 2 story woodworking plant. Estimated cost $40,000. Architect not selected.

Wis., Manitowoc — Aluminum Specialty Co., South 17th and Wollmer Sts., awarded contract for the construction of an 82 x 120 ft. addition to factory. Estimated cost $40,000.

Wis., Milwaukee—B. E. Nasnot, c/o R. E. Oberst, 128 Grand Ave., Archt., is having plans prepared for the construction of a 1 story factory on Harmon St. Estimated cost $25,000.